

Angelika Bikner-Ahsbahs (Prof. Dr.)

Curriculum vitae

Content:

- Scientific education and professional career, research and teaching
- Funding
- Invited talks
- Publications
- Supervision of PhD students
- Review and supervision of bachelor and master theses
- Main contributions as service to the field
- Transfer

Scientific Education and Professional Career:

Research areas:

Construction of mathematical knowledge and conditions that foster or hinder it, interest research in mathematics education, classroom studies, epistemological and methodological issues on empirical research in mathematics education, networking of theories in mathematics education, design of learning environments in mathematics, learning difficulties in Arithmetic and Algebra, mathematics education on functions and algebra, semiotics and digital tools, theories in mathematics education

Scientific education and career steps

- 1972–1978: Studies in Mathematics and Physics, Technical University of Braunschweig (two qualifications: "Diplom" in Mathematics and 1. "Staatsexamen" - Exam for the preparation to be a teacher for mathematics and physics at the German Gymnasium).
- 1979-1981: Teacher training (2. "Staatsexamen", Institute for Teacher Training, Lüneburg)
- 1981-1991: Teacher, Max-Planck-School, Kiel
- 1991-1995: Research collaborator at the University of Kiel
- 1995-1998: Teacher, "Max-Planck-School" in Kiel
- 1997 Ph.D. in mathematics education at the University of Kiel (CAU)
- 1998-2003: Research collaborator, University of Flensburg
- 2003-2004: Professorship, University of Flensburg
- 2004-2005: Professorship, Technical University of Braunschweig
- 2004 Habilitation, University of Flensburg
- 2005-2006: Teacher, Ernst-Barlach-Gymnasium, Kiel
- 2006-2018 Full Professor at the University of Bremen
- 2006-2014 Coordinator of the European Group of Researchers: "Bremen networking theories group"
- 2014-2017 Co-chair of the Creative Unit FaBiT
- 2016-2019 Chair of the subproject "Spotlights-Lehre" of the project "Schnittstellen Gestalten" in the German Campaign for improving teacher education.
- 2016-2019 Co-chair of the MAL-project (Multimodal Algebra Learning)
- 2021-2024 Senior Fellow of the Duale Promotion, a graduate program on design based research, matching a PhD and the "Referendariat" to gain a teaching certificate.
- 2021-2024 Co-applicant for a DFG-Network Design-based research (DBR-Netzwerk) funded by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG)
- 2021-2023 Professor II-Position (20 %) in at the Western Norway University of Applied Sciences, Bergen.
- 2021-2023(-24) Associate editor of the Educational Studies in Mathematics
- 2018-now Prof. (retired, but with further membership equivalence for the university)

Current research

- (1) Design based research a methodological frame for educational research. Clarifying standards, and epistemological and ontological basics. <https://dbr.blogs.uni-hamburg.de/>
- (2) RiskDesign: Developing risk competency in statistics education, a DBR-Project in the graduate programme Duale Promotion. <https://www.uni-bremen.de/zflb/duale-promotion> (PhD-student: Marie Brehm)
- (3) The Role of Rhythm for teaching and learning (design research) (Collaboration with Arthur Bakker (The Netherlands), Andrea Maffia (Italy), Jana Trgalova (France), Dorota Lembrér (Sweden))

- (4) Learning with and through digital tools: Developing a digital learning tool on the sine function (design research, AI, Master theses, publications, Jonas Brinkmann).
- (5) Views on Formulas (research on design in collaboration with Marit H. Schou)
- (6) Mathematical Communication while using digital tools (Collaboration in the PhD project of Cecilie Bach).
- (7) DeciPlace: Design of a learning arrangement for decimal numbers based on a digital place value chart) (PhD-project, DBR, Daniela Schansker).
- (8) Teacher praxeologies for a flexible use of functions (PhD project of Mareike Best)
- (9) Mathematical Internet Memes, phenomenon in the web.2.0 culture and resource for teaching (Collaboration with Giulia Bini and Ornella Robutti).
- (10) BasicTheory: Foundation of theory building and networking of theories
- (11) Risk Design – Duale Promotion (Scholarship Program of the University of Bremen, (57000001/691 52 014).
- (12) *Completed*: Multimodal Algebra Lernen (MAL), interdisciplinary design project to develop a Multimodal Algebra Learning System (2016-2019), Publications can still be expected. <http://mal-projekt.de/>
- (13) *Completed*: Spotlight Lehre (2016-2019, erste Phase), funded by the BMBF (German Ministry of Education and Research) in the „Qualitätsoffensive Lehrerbildung“, DBR-projects: Reducing Fragmentation in University Pre-Service Teacher Education. Conditions and Strategies. <https://doi.org/10.15460/eder.5.2.1613> and Transferpaket [Transfer package]: <https://media.suub.uni-bremen.de/handle/elib/4314>.
- (14) Completed in March 2024: DBR-Netzwerk, funded by the DFG.

Current research interest:

Developing epistemic action models that connect different theoretical perspectives such as the cognitive, the social, the semiotic in different mathematical learning areas (for example geometry, calculus, algebra, modeling). Aim is to establish a background theory for the design of suitable learning environments in mathematics and for understanding teaching-learning-processes better. This also refers to the interconnection of interest in mathematics and epistemic processes. The idea is to reconstruct conditions that foster and hinder knowledge construction in mathematics. In this respect, gestures play a crucial role. Newly, the role and value of “smart objects” come into play. This leads to a multimodel view on knowledge construction that includes the body, inscriptions and technology.

Included is the empirically based investigation of the epistemology of the networking of theories in mathematics education, which is a methodological research interest embedded in a European research group.

In addition, design based research is a methodological approach in research, which becomes more and more important for higher education in pre-service teacher training at the university level as it meets our interest in research-based learning. Design research is also important for task development (e.g. with digital media), in the interdisciplinary research group FaBiT and for the development of conceptions for inclusive instruction in mathematics and our interdisciplinary project MAL, learning Algebra in a multimodal way. Design research is also done at university level in pre-service teacher education which is addressed by the project Spotlights-Lehre. This project aims at interlocking education in mathematical content knowledge and pedagogical content knowledge, at least as an example experience for the students in order make them aware of the relevance of their academic education for their future professional work as a mathematics teacher.

Design based research continues with the graduate program “Duale Promotion” which has been set up to achieve two qualification, the teaching certificate in the “Referendariat” and PhD. I will supervise the students as a senior fellow with a focus on design-based research.

A more recent research interest builds upon my experience of supporting PhD-students in many areas. The current study investigates a virtually conducted summer school, YESS10, addressing learning through boundary crossing in a virtual environment. Rhythm seems to be a key characteristic of the design of teaching through conference systems.

The interests in design research, learning with digital technology and the networking of theories have resulted in two main achievements. (1) How mathematical communication is related to digital technology use and thereby can or cannot foster mathematical communication competency. (2) The phenomenon that good teachers when supporting mathematical argumentation have to work on two layers synchronically, sequentially following the line of thinking in class and epistemologically supporting pieces of students’ arguments independent of the moment-to-moment interaction to shape the full argumentation that only becomes visible in the end.

Main teaching interests and experience:

Mathematics:

Arithmetic, elementary Algebra, elementary Modelling, elementary Calculus, Graph Theory and elementary Topology, elementary Geometry.

Mathematics Education:

Fundamental concepts in Mathematics Education, Mathematics Education on Functions, on Algebra, on Calculus, Task Design, Argumentation and Proving, Representations, Problem Solving, Preparing and Accompanying Practical Teaching, Diagnosing and Fostering in the classroom.

Research in mathematics education:

Design research, qualitative research methodologies, theories in mathematics education including networking of theories, professional development, transfer issues, ethical issues, classroom studies, ethnographic studies, semiotics and gesture, tool use including digital tool, curriculum development.

Funding since 2006

- 2006 Workshop for the international research group “building networking theories”, Bremen University (about 4 TEuro)
- 2007-2008: Curriculum development for Grade 11 and 12, Bremen Government (about 8 TEuro)
- 2009, 2011: Workshop for the international research group “building networking theories”, Nolting-Hauff-Stiftung, Sparkasse Bremen (about 8 TEuro)
- 2008-2011: Together with Tommy Dreyfus /Tel Aviv University) and Ivy Kidron (Jerusalem College of Technology): Effective knowledge construction in interest-dense situations, funded by the German-Israeli-Foundation (about: 65 TEuro for Bremen)
- 2010-2013: The role of signs in constructing mathematical knowledge, funded by Bremen University (PhD-students + travelling)
- 2011-2013: Together with Bernd Stratmann and Marc Keßeböhmer (Bremen University) Research based learning in mathematics, funded by the University of Bremen (PostDoc position)
- 2010-2011: Offensive Bildungsstandards, advancement for teachers at primary schools, funded by the State of Bremen (cooperation with Prof. Bönig, FB 12, about 10 TEuro)
- 2010-2012: Establishing a center for mathematics education, called matelier, funded by the state of Bremen and Bremen University (about 85 TEuro)
- 2011-2014: Offensive Bildungsstandards, advancement for teachers at secondary schools, funded by the State of Bremen (about 30 TEuro)
- 2014-2015: Maffunt: An in-service program to advance out-of-field mathematics teachers (Cooperation with Hans-Dieter von Zelewski, funded by DZLM, Deutsches Zentrum für Lehrerfortbildung in Mathematik, 6 TEuro)
- 2016-2018: Maffunt: Supporting out-of-field teachers in Bremen, together with LIS (leading institution for in-service teacher education) (funded by DZLM)
- 2014-2017: EdU-MINT: funded by the Telecom foundation (Entwicklungsverbund 2 zur Lehrerbildung *Diagnose und Förderung heterogener Lerngruppen*, with the Universities Dortmund, Essen, Oldenburg), in Bremen two projects (Knipping, Bikner-Ahsbahs, Bönig, Markic) are supported for together 180 TEuro.
- 2014-2017: FaBiT: Creative Unit “Fachbezogene Bildungsprozesse in Transformation“ funded by the Excellence Initiative (interdisciplinary consortium of six subject educators), ca. 720 TEuro (<https://www.uni-bremen.de/zflb/projekte-forschung/abgeschlossene-projekte/creative-unit-cu>)
- 2016-2019: MAL: Multimodal Algebra Lernen; interdisziplinäres Projekt der AG Mathematikdidaktik (Co-chair: Bikner-Ahsbahs, David Reid) mit dem digitalen Medienlabor (Chair: Rainer Malaka), Westermann-Verlag, der Firma xCon und der ifib. Ziel des Projekts ist die Entwicklung von “smart objects” und die Erforschung der Rolle, die sie bei der Unterstützung des Algebra-Lernens in einer multimodalen Weise spielen. Gefördert durch die BMBWF für die Universität Bremen über 720 TEuro. (<http://mal-projekt.de/>)
- 2016-2019: Chair of Spotlights: partial project T4 of the “Qualitätsoffensive Lehrerbildung” der Universität Bremen. Dieses Projekt hat zum Ziel, die Verbindung von Fachwissen und pädagogischem Fachwissen in der Lehre und dem Lernen auf der Universitätsebene zu fördern. Erste Ansätze werden in zwei Studienbereichen, in der Mathematik

(Spotlight-Y) and English Speaking Cultures (Varieties) (2 PhD-positions + funding for traveling and material, <https://www.uni-bremen.de/zflb/projekt-forschung/schnittstellen-gestalten-qualitaetsoffensive-lehrerbildung/teilprojekte/digi-spotlights>).

2016-2019: Spotlight-Y: Integrating Mathematics and Mathematics education at the university level. (Co-application with Marc Keßeböhmer and Ingolf Schäfer, 1 PhD position)

2021-2024: DBR-Network ((Design-Based-Research) DBR-Netzwerk, funded by the DFG, German Research Foundation), Chair Gabi Reinmann, University of Hamburg. <https://dbr.blogs.uni-hamburg.de/>

Invited talks, workshops, seminars & professional development (a collection)

- 2009 **Key note** in the special plenary of CERME 6: Networking of theories – why and how?
- 2009 University of Oldenburg: Vernetzung von Theorieansätzen: Analyse eines Erkenntnisprozesses zur Exponentialfunktion
- 2009 Universität Bielefeld: Mathematische Erkenntnisentwicklung im alltäglichen Mathematikunterricht fördern - aber wie?
- 2009 University of Hamburg: Vernetzt forschen- Theorie voranbringen
- 2010: University of Darmstadt: Mathematikinteresse fördern – geht das? Einblicke in die Theorie interessendichter Situationen
- 2011 **Key note** at the annual conference of the German Society of Mathematics Education: Epistemisch handeln können – aber wie?
- 2011: University of Kassel: Mit Interesse Mathematik lernen – ein utopisches Ziel?
- 2012: Freie Universität Berlin: Auf dem Weg zu einem 3Komponenten-Modell (3K-Modell) zur Wissenskonstruktion?
- 2013 MNU-Konferenz, Kiel: Zu mathematischen Erkenntnissen gelangen – aber wie?
- 2014 Universität Essen Duisburg: Zeig `mal, was du meinst! Die Rolle von Gesten bei der Konstruktion mathematischen Wissens
- 2015 **Key note** at the University of Tel Aviv: What we know and what we don't know about interest-dense situations (IDS)
- 2016 **Expert talk** at YESS08 (Summer School of ERME), in at Poděbrady (Czech Republic): Building a theory about interest-dense situations: a research journey
- 2017 **Key note** at the Turin University at International Seminar on semiotics: A coordinate system as a reference diagram for graphical representations*
- 2018 University of Potsdam: Multimodal Algebra lernen - Einblicke in ein interdisziplinäres Technologieprojekt
- 2018 Universität of Braunschweig, Inklusion als Chance zur Neuausrichtung von Mathematikunterricht
- 2018 **Expert talk** at YESS09 (Summer School of ERME), in Montpellier, France: Emergent tasks: A story about how a theory-driven idea became a practical tool
- 2019 (Mai), talk at Turin University: The Networking of Theories: Past Experience and Future Tasks
- 2019 **Key note** at the ICTMT 14, University of Essen, Networking of Theories reconsidered
- 2019 MNU-Conference, Kiel: Algebra technologiegestützt lehren und lernen
- 2019 Agdar University, Norway (talk and workshop) Networking of Theories: Looking at the past, the current and possible future developments
- 2020 **Two expert talks** at YESS 10–online (Summer School of ERME):
- Emergent tasks: A story about how a theory-driven idea became a practical tool
- The role of theory in a research framework
- 2020 **Invited Workshop:** Workshop Prinzipien von Design-Based Research (DBR) erfahren, erlernen und erproben. Invited online workshop for the University of Rostock

- 2021 Three Workshops on Design-Based Research for in the Graduate Programme *Duale Promotion*, February, April und June 2021 (Bremen University)
- 2021 Workshop in the “Scuola Estiva di Dottorato in Didattica della Matematica organizzata dall' AIRDM, Associazione Italiana di Ricerca in Didattica della Matematica Online – 7-24 giugno 2021 on the topic: esearch in Design-based Research in mathematics education
- 2021 **Invited Expert talk** at YESS11 (Summer School of ERME) in August 2021:
- Coherence and consistency: Sibling principles in the practice of research
- 2021 (February) **Invited talk**, online, at the Western Norway Univeristy of Applied Sciences, Bergen. Title: Emergent tasks: How to bridge an epistemological gap
- 2021 **Symposium at ECER 2021**, 06.-10. September 2021, Boundary Crossing, Tool Use and Rhythm During an Online Summer School, Authors: Angelika Bikner-Ahsbahs, Bremen University, Germany & Arthur Bakker, Utrecht University, the Netherlands. Talk: Rhythm Experiences in Learning and Development, authors: Angelika Bikner-Ahsbahs, Bremen University, Germany & Dorota Lembrér, Malmö University,
- 2022 Angelika Bikner-Ahsbahs (26.10.2022) Talk at Western Norway University of Applied Science, Bergen, Title: **Unpacking hidden views on formulas**
- 2022 Angelika Bikner-Ahsbahs (8.11.2022). **Invited Talk** related to AR-Designat the Symposiums „*Augmented Reality in Mathematics Education*“ at Ben Gurion Universität, Beersheva in the Negev, Israel. Title: **Some ideas on space in an AR-inquiry learning environment.**
- 2022 Angelika Bikner-Ahsbahs (9.11.2022). **Invited Talk** at Tel Aviv University about ethnographische Studies on Internet memes, *reverse engineering* about the creation of Internet Meme. Title: ***The mathematical meme sphere – a space of epistemic culture.***
- 2022 Angelika Bikner-Ahsbahs (23.11.2022). **Invited Talk** for early career researchers at NCUM Pre-conference 2022: Young Researchers Day. Tile: **Coherence and consistency: Sibling principles in the practice of research and design. (Link: <https://matematikdidaktik.dk/aktuelt/ncum-inviterer-til-young-researchers-day-1>)**
- 2022 Angelika Bikner-Ahsbahs (13.12.2022). **Invited talk** at Universität Köln. Title: ***Formeln selektiv ,sehen‘: "Unpacking hidden views on formulas"***. <https://mathedidaktik.uni-koeln.de/kolloquium>.
- 2023 Angelika Bikner-Ahsbahs (01.05.2023) **Invited talk** in the pre-CERME meeting of TWG15, 16 of CEME13. Title: Networking of theories related to learning with technology.
- 2023 Angelika Bikner-Ahsbahs (18.12.2023, 19.12.23) Invited by the University of Milan to conduct seminars on “interest dense situations” and “Networking of Theories”
- 2023 Angelika Bikner-Ahsbahs & Marie Brehm, (25.11.2023) Talk about „risk literacy – a hybrid concept for statistical education” at the Western Norway University of Applied Sciences

All in all, more than 200 further talks were given as presenter or co-presenter during conferences, symposia, workshops, within the consortia of research projects, in lectures on the national as well as international level beyond teaching requirement at the university. Many of them resulted in contributions of proceedings listed in the publications.

Publications

Earlier publications in the context of the PhD address how to support individual interest. Other publications are published in teacher education journals, these are about practical teaching.

2004

1. Bikner-Ahsbahs, A. (2004). Interest-dense Situations and their Mathematical Valences. (Topic Study Group 24 (Students' motivations and attitudes towards mathematics and its study) of the International Congress for Mathematics Education (www.cme-10.dk, programme, TGS24). Copenhagen: 2004, (peer reviewed).
2. Bikner-Ahsbahs, A. (2004). Towards the emergence of constructing mathematical meanings. In: Marit Johnsen Høines & Anne Berit Fuglesand: proceedings of the 28th conference of the International Group for the Psychology of Mathematics Education, vol. 2, 119-127. (peer-reviewed)

2005

3. Bikner-Ahsbahs, A. (2005). Mathematikinteresse zwischen Subjekt und Situation. Empirisch begründete Konstruktion einer Theorie interessendichter Situationen. [Interest in Mathematics between Subject and Situation. Building bricks for an interest theory in Mathematics Education.] Habilitation at Flensburg University, 2004. Hildesheim: div Verlag Franzbecker.
4. Bikner-Ahsbahs, A. (2005). Crossing the Border – Integrating different paradigms and perspectives. In Marianna Bosch (Ed.): Contribution to the working group 11 (Different theoretical Perspectives and Approaches in Mathematics Education) of CERME 4 (Fourth Congress of the European Society for Research in Mathematics Education) at Sant Feliu de Guixols (Spain), (CD), (peer reviewed)

2006

5. Bikner-Ahsbahs, A. & Susanne Prediger (2006). Diversity of Theories in Mathematics Education – How can we deal with it? Zentralblatt der Didaktik der Mathematik (ZDM), vol. 38, 52-57. (invited and peer-reviewed)
6. Bikner-Ahsbahs, A. (2006). Semiotic sequence analysis – Constructing epistemic types. In Jarmila Novotná, Hana Moraovská, Magdalena Krátká, Nad'a Stehliková (Eds.): Mathematics in the centre. Proceedings of the 30th Conference of the International group for the Psychology of Mathematics Education, vol. 2, (pp. 161-168) Prague (Czech Republic): Charles University, Faculty of Education. (peer-reviewed)

2007

7. Bikner-Ahsbahs, A. (2007) "Sensitizing concepts" as heuristics to compare and connect different theories. Contribution to the symposium: Networking a variety of theories within a scientific domain - The case of mathematics education, EARLI (European Association for Research on Learning and Instruction) August 2007. (peer reviewed)
8. Bikner-Ahsbahs, A. & Peter-Koop, A. (2007) (Eds.) Mathematische Bildung - Mathematische Leistung. [Mathematical education – mathematical achievement.] Festschrift for Michael Neubrand to his 60th birthday. Hildesheim, Berlin: Franzbecker Verlag.
9. Bikner-Ahsbahs, A. (2007). Ein Vergleich von Handlungsmodellen zur Entstehung mathematischen Wissens in Lehr-Lern-Situationen. [Comparison of action models for the creation of mathematical knowledge in teaching and learning situations.] In Angelika

Bikner-Ahsbahs & Andrea Peter-Koop (Eds.), *Mathematische Bildung - Mathematische Leistung*, Festschrift for Michael Neubrand to his 60th birthday, (pp. 251-270). Hildesheim, Berlin: Franzbecker Verlag.

10. Kidron, I., Lenfant, A., Artigues, M., Bikner-Ahsbahs, A. & Dreyfus, T. (2008). Social interaction in learning processes as seen by means of three theoretical frameworks. In D. Pitta-Pantazi & G. Phillipou (Eds.), *Proceedings of the 5th Congress of the European Society for Research in Mathematics Education (CERME 5)* (pp. 1708–1724). Cyprus: ERME. (peer-reviewed)

2008

11. Kidron, I., Lenfant, A., Artigues, M., Bikner-Ahsbahs, A. & Dreyfus, T. (2008). Social interaction in learning processes as seen by means of three theoretical frameworks. *ZDM-International Journal on Mathematics Education*, 39(2), 247-267. (invited and peer-reviewed)
12. Bikner-Ahsbahs, A. (2008). Erkenntnisprozesse – Rekonstruktion ihrer Struktur durch Idealtypenbildung. [Epistemic processes – reconstructing the structure through building ideal types] In Helga Jungwirth, Götz Krummheuer (Eds.), *Der Blick nach innen: Aspekte der täglichen Lebenswelt Mathematikunterricht*. (pp. 105-144) [The view inside: aspects of everyday life called mathematics classroom.] Münster: Waxmann, (invited).
13. Prediger, S., Bikner-Ahsbahs, A. & Arzarello, F. (2008). Networking strategies and methods for connecting theoretical approaches: first steps towards a conceptual framework. *ZDM-International Journal on Mathematics Education*, 40(2), 165-178. (peer-reviewed)
14. Bikner-Ahsbahs, A. (2008) *Wie konstruieren Lernende mathematisches Wissen?* [How do students construct mathematical knowledge?] *Beiträge zum Mathematikunterricht*, Hildesheim, Berlin: Franzbecker Verlag (CD).

2009

15. Bikner-Ahsbahs, A. (2009). Interessenlage und Erkenntniszugang. [Interest sphere and epistemic approach] *Beiträge zum Mathematikunterricht 2009, Vorträge zur Tagung der Gesellschaft für Didaktik der Mathematik (GDM) in Oldenburg*. Hildesheim, Berlin: div Franzbecker. CD.
16. Bikner-Ahsbahs, A. & Williams, G. (2009). Comparing and contrasting methodologies: a commentary. In Baruch Schwarz, Rina Hershkowitz and Tommy Dreyfus (Eds.), *Transformation of Knowledge in Classroom Interaction*, (pp. 261-270). London, New York: Routledge. (invited)
17. Schäfer, I. & Bikner-Ahsbahs, A. (2009). „Schwache“ Schüler motivationsorientiert fördern. [Fostering low-achieving students in a motivational way]. In Siegbert Schmidt (Ed.), *Fördernder Mathematikunterricht in der Sekundarstufe I – Rechenschwierigkeiten erkennen und überwinden*, (pp. 201-212). Weinheim, Basel: Beltz Verlag. (invited)
18. Arzarello, F., Bikner-Ahsbahs, A. & Sabena, C. (2009). Complementary networking: enriching understanding. In V. Durand-Guerrier, S. Soury-Lavergne, and S. Lecluse (Eds.), *Proceedings of CERME 6*. Lyon, France. Retrieved August 23, 2010 from <http://www.inrp.fr/publications/edition-electronique/cerme6/plenary-01-bikner.pdf>, published as a CD. (peer-reviewed)

19. Bikner-Ahsbahs, A. (2009). Networking of theories – why and how? Special plenary lecture. In V. Durand-Guerrier, S. Soury-Lavergne, and S. Lecluse (Eds.), *Proceedings of CERME 6*. Lyon, France. Retrieved August 23, 2010 from <http://www.inrp.fr/publications/edition-electronique/cerme6/plenary-01-bikner.pdf> , published as a CD. (peer -reviewed)
20. Bikner-Ahsbahs, A. & Schäfer, I. (2009). Object Relations and epistemic actions of low-achieving students. In Marianna Tzekaki, Maria Kaldrimidrou, Haralambos Sakonidis (Eds.), *In Search for Theories in Mathematics Education, Proceedings of the 33th Conference of the International Group for the Psychology of Mathematics Education, Vol. 1* (p. 337). Thessaloniki-Greece: Moucos-Communication in Print. (peer-reviewed)
21. Cramer, J. & Bikner-Ahsbahs, A. (2009). Mathematical interest spheres and their epistemic function. In Marianna Tzekaki, Maria Kaldrimidrou, Haralambos Sakonidis (Eds.), *In Search for Theories in Mathematics Education, Proceedings of the 33th Conference of the International Group for the Psychology of Mathematics Education, Vol. 2* (353-361). Thessaloniki-Greece: Moucos-Communication in Print.(peer-reviewed)

2010

22. Bikner-Ahsbahs, A., & Prediger, S. (2010). Networking of Theories—An Approach for Exploiting the Diversity of Theoretical Approaches; with a preface by T. Dreyfus and a commentary by F. Arzarello. In B. Sriraman & L. English (Eds.), *Theories of mathematics education: seeking new frontiers* (pp. 479-512). New York: Springer, *Advances in Mathematics Education series, Vol. 1*. (peer reviewed)
23. Bikner-Ahsbahs, A., Dreyfus, T., & Kidron, I. (2010). “General Epistemic Need” – ein Motor für Erkenntnisentwicklung? [General epistemic need - an engine for construction of knowledge?]. In *Beiträge zum Mathematikunterricht. Vortrag auf der Jahrestagung der Gesellschaft für Didaktik der Mathematik (GDM) 2010 in München*. Retrieved: 2.5.2012 from: http://www.mathematik.tu-dortmund.de/ieem/cms/media/BzMU/BzMU2010/BzMU.10_BIKNER-AHSBAHS_Angelika_Erkentnisentwicklung.pdf
24. Bikner-Ahsbahs, A., Dreyfus, T., Kidron, I., Arzarello, F., Radford, L., Artigue, M., & Sabena, C. (2010). Networking of theories in mathematics education. In Pinto, M. M. F. & Kawasaki, T. F. (Eds.), *Proceedings of the 34th Conference of the International Group for the Psychology of Mathematics Education (Vol. 1, pp. 145-175)*. Belo Horizonte, Brazil: PME. (peer-reviewed)
25. Kidron, I., Bikner-Ahsbahs, A. Cramer, J., Dreyfus, T., & Gilboa, N. (2010). Construction of knowledge: need and interest. In Pinto, M. M. F. & Kawasaki, T. F. (Eds.), *Proceedings of the 34th Conference of the International Group for the Psychology of Mathematics Education (Vol. 3, pp. 169-176)*. Belo Horizonte, Brazil: PME. (peer-reviewed)
26. Cramer, J. & Bikner-Ahsbahs, A. & Harel, R. (2010). Argumentation Processes: Structure and Quality. In Pinto, M. M. F. & Kawasaki, T. F. (Eds.), *Proceedings of the 34th Conference of the International Group for the Psychology of Mathematics Education (Vol. 2, pp. 23)*. Belo Horizonte, Brazil: PME. (peer-reviewed)

2011

26. Bikner-Ahsbahs, A., Kidron, I. & Dreyfus, T. (2011). Epistemisch handeln können – aber wie? [Knowing to act epistemically – but how?] Hauptvortrag auf der Jahrestagung der

GDM. [Invited lecture]. Beiträge zum Mathematikunterricht 2011, Gesellschaft für Didaktik der Mathematik (CD).

27. Kidron, I., Bikner-Ahsbahs, A., & Dreyfus, T. (2011). How a general epistemic need leads to a need for a new construct: A case of networking two theoretical approaches. In: Pytlak, M.; Rowland, T. & Swoboda, E. (Eds.), Proceedings of the 7th Congress of the European Society for Research in Mathematics Education (pp. 2451-2461). Rzeszów: University of Rzeszów, Poland (peer-reviewed).
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2012

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106. Bikner-Ahsbahs, A. (2019). The Research Pentagon: A Diagram with which to Think about Research. In G. Kaiser and N. Presmeg (Eds.), *In Compendium for Early Career Researchers in Mathematics Education* (pp. 153-180). Wiesbaden: Springer. (peer-reviewed)
107. Janßen, T., Reid, D., & Bikner-Ahsbahs, A. (2019). Issues in modelling terms involving subtraction in a manipulative environment for linear equations—and a possible solution. In U. T. Jankvist, M. van den Heuvel-Panhuizen, & M. Veldhuis (Eds.), *Proceedings of the 11th Congress of the European Society for Research in Mathematics Education* (pp. 2852-2859). Utrecht, the Netherlands: Freudenthal Group & Freudenthal Institute, Utrecht University and ERME (peer-reviewed)
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109. Hanke, E., & Bikner-Ahsbahs, A. (2019) Boundary crossing by design(ing): A design principle for linking mathematics and mathematics education in preservice teacher. In U. T. Jankvist, M. van den Heuvel-Panhuizen, & M. Veldhuis (Eds.), *Proceedings of the 11th Congress of the European Society for Research in Mathematics Education* (pp. 3046-3053). Utrecht, the Netherlands: Freudenthal Group & Freudenthal Institute, Utrecht University and ERME (peer-reviewed)
110. Bikner-Ahsbahs, A., Bakker, A., Johnson, H. L., & Chan, M. C. E. (2019). Introduction to the Thematic Working Group 17 on Theoretical Perspectives and Approaches in Mathematics Education Research of CERME 11. In U. T. Jankvist, M. van den Heuvel-Panhuizen, & M. Veldhuis (Eds.), *Proceedings of the 11th Congress of the European Society for Research in Mathematics Education* (pp. 3020-3027). Utrecht, the Netherlands: Freudenthal Group & Freudenthal Institute, Utrecht University and ERME
111. Bikner-Ahsbahs, A. (2019). Networking of theories reconsidered. In B. Barzel & F. Schacht (Hrsg.), *Proceedings of the ICTMT14, Universität in Essen-Duisburg vom 22. - 25. Juli, 2019.*(invited talk)
112. Bikner-Ahsbahs, A., Janßen, T., Bollen, S., Alexandrovsky, D., Döring, T., Malaka, R. & Reinschlüssel, A. (2019). View on equations. Sequential versus relational. In Anna Shvarts (Ed.), *Proceedings of the PME and Yandex Russian Conference. Technology and Psychology on Mathematics Education* (p. 246). Moscow, Russia: HSE Publishing House. (peer-reviewed)

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113. Bikner-Ahsbahs, A. (2020). *Spotlights Lehre. Transferpaket zur Verzahnung und Vernetzung von Fachwissenschaft und Fachdidaktik*. <https://doi.org/10.26092/elib/99>
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116. Bikner-Ahsbahs, A., Vallejo-Vargas, E. & Rohde, S. (2020, accepted, presented 2021). The role of feedback when learning with an artifact. Paper accepted for the TSG57 of: *The 14th International Congress on Mathematical Education*, Shanghai, 12th –19th July, 2020 (peer-reviewed)
117. Bini, G., Robutti, O. & Bikner-Ahsbahs, A. (2020). Maths in the time of social media: conceptualizing the Internet phenomenon of mathematical memes. *International Journal of Mathematics Education in Technology and Science* (online). doi.org/10.1080/0020739X.2020.1807069 (peer-reviewed)
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120. Janßen, T., Vallejo-Vargas; E., Bikner-Ahsbahs, A. & Reid, D. A. (2020). Design and Investigation of a Touch Gesture for Dividing in a Virtual Manipulative Model for Equation-solving. *Digital Experiences in Mathematics Education* (online) doi.org/10.1007/s40751-020-00070-8 (peer-reviewed)

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121. Bikner-Ahsbahs, A., & Bakker, A. (2021). *Experience of Boundary Crossing, Tool Use and Rhythm during an online summer school*. Symposium at ECER 2021, Network 24, in Geneva, (online, peer-reviewed))
122. Bikner-Ahsbahs, A. & Dorota Lembrér (2021). *Rhythm experiences in learning and development during an online summer school*. Paper presented at ECER2021, Network 24, Geneva (online, peer-reviewed))
123. Bikner-Ahsbahs, A., Vallejo-Vargas, E., & Rohde, S. (2021). Role of feedback when learning with an artifact. Paper presented at ICME14, Shanghai, online, (peer-reviewed)
124. Brehm, M., & Bikner-Ahsbahs, A. (2021). Developing Risk literacy at secondary level. In C. Fernández, S. Llinares, A. Gutiérrez, & N. Planas (Eds.), *Proceedings of the 45th Conference of the International Group for the Psychology of Mathematics Education* (Vol. 4, p. 337). PME

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126. Schou, M. H., & Bikner-Ahsbahs, A. (2021). Unpacking hidden views: Seven ways to treat your formula. *Educational Studies in Mathematics*, online first, <https://doi.org/10.1007/s10649-021-10092-7> (peer-reviewed)
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132. Bikner-Ahsbahs, A. (2022). Mathematiklehren und -lernen digital – Theorien, Modelle, Konzepte. In: Pinkernell, G., Reinhold, F., Schacht, F., Walter, D. (Eds), *Digitales Lehren und Lernen von Mathematik in der Schule*. Springer Spektrum, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-65281-7_2 (peer-reviewed)
133. Bikner-Ahsbahs, A. (2022). Adaptive teaching: “the way of being” on two layers. In Osama Swidan & Frdianndo Arzarello (Eds.), special Issue on Adaptive instruction in an inquiry-based mathematics and digitally rich classroom – multiple perspectives. *Journal of Mathematical Behavior*, 67, 100967. <https://doi.org/10.1016/j.jmathb.2022.100967>
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139. Bikner-Ahsbahs (2023). Problemlösen. In Erfahrung verankern und kultivieren. *Mathematik 5-10*, 38-41.
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141. Bikner-Ahsbahs, A., Kidron, I, Bullock, E., Shinno, Y. & Zhang, Q. (2023, in print). Topic Study Group 57: Diversity of Theories in Mathematics Education. Jianpan Wang (Ed.), *Proceedings of the 14th International Congress on Mathematical Education*. World Scientific Publishing House. <https://www.mathunion.org/icmi/proceedings-icme-14>
142. Bikner-Ahsbahs, A. et al. (2023). Pragmatic approach to theorizing interdisciplinary design research: Multimodal interactive algebra learning systems with tangible user interfaces. In Birgit Pepin, Ghislaine Gueudet and Jeff Choppin (Eds.), *Handbook of digital (curriculum) resources in mathematics education*, Springer. https://link.springer.com/referenceworkentry/10.1007/978-3-030-95060-6_3-1 (peer-reviewed)
143. Bikner-Ahsbahs, A., et al. (Eds. 2023). Special Issue on the diversity of theories (TSG 57 of ICME14). *Hieroshima Journal of Mathematics education* 16. https://www.jasme.jp/hjme/download/2023/Vol16_01.pdf (peer-reviewed)
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145. Brehm, M. & Bikner-Ahsbahs A. (2023). To develop risk literacy – a design-based research approach. In Drijvers, P., Csapodi, C., Palmér, H., Gosztonyi, K., & Kónya, E. (Eds.). (2023). *Proceedings of the Thirteenth Congress of the European Society for Research in Mathematics Education (CERME13)* (pp. 884-891). Alfréd Rényi Institute of Mathematics and ERME. <http://erme.site/cerme-proceedings-series/> (peer-reviewed)
146. Brehm, M., & Bikner-Ahsbahs, A. (2023). “The time they are a-changing”: A need to develop risk literacy. In K. le Roux, A. Coles, R. Barwell, M. Borba, A. Chronaki, R. Gutiérrez, M. Makramalla, A. Parra, M. Rosa, A. Solares-Rojas, J. Subramanian and L. Hennessy (Eds.), *Proceedings of the ICMI Symposium on “Mathematics Education and the Socio-Ecological” on 20th March 2023* (GMT). <https://www.mathunion.org/fileadmin/ICMI/Conferences/Socio%20Ecological/Proceedings-ICMI-symposium-20th-march-2023.pdf>

147. Wagner, D., Prediger, S., Artigue, M. *et al.* (2023) The field of mathematics education research and its boundaries. *Educational Studies in Mathematics*, 114, 367–369. <https://doi.org/10.1007/s10649-023-10270-9>

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148. Bikner-Ahsbahs, A. (2024). Design research on an online summer school in mathematics education: An insight into philosophical commitments. *Educational Design Research* 8(1), article 63. <https://doi.org/10.15460/eder.8.1.2129> (peer-reviewed)
149. Bikner-Ahsbahs, A., & Johnson, H. L. (2024, in print). Advancing mathematics education on digital resources: a reciprocity between theory, methodology, and design. In Birgit Pepin, et al. (Eds), *Handbook of digital (curriculum) resources in mathematics education*, Springer. (peer-reviewed)
150. Bikner-Ahsbahs, A. (2024, in print). Wie Lernende Formeln "sehen". *Proceedings der GDM-Tagung 2024*.
151. Bikner-Ahsbahs, A. & Knipping, C. (2024, in print). Das matelier: eine Raumkonzeption. In Bernadette Thöne, Anna Körner, Jonathan von Ostrowski, Roland Rink, Johanna Scharlau, Daniel Walter (Eds). „*Was hast du dir dazu überlegt?*“. Untertitel: *Denkwege von Kindern und Inhalte gleichermaßen in den Blick nehmen*. Buchreihe: Festschriften der Mathematikdidaktik. WTM, Band 10.

PhD students

Review and supervision

(2014) Thomas Bardy: Zur Herstellung von Geltung mathematischen Wissens im Mathematikunterricht [constituting validity of mathematical knowledge in mathematics instruction]

(2015) Christina Krause: The mathematics in our hands. How gestures contribute to constructing mathematical knowledge.

(2016) Thomas Janßen: Entwicklung algebraischen Struktursinns im Klassenunterricht [Developing structure sense in the classroom] (design research)

Co-Reviewer:

(2009) Andreas Busse: Umgang Jugendlicher mit dem Sachkontext realitätsbezogener Aufgaben (Universität Hamburg, Fachbereich Erziehungswissenschaften) [How adolescents cope with the content context of realistic tasks]

(2011) Gudrun Stefan: Motivation und Interesse im Mathematikunterricht der Grundschule. Genese – Indizierung – Förderung (Philosophischen Fakultät der Universität Passau) [Motivation and interest in primary school. Genesis – indication – support]

(2014) Roxana Grigoras: On Assumptions and Hypotheses in Mathematizing by Tasks without Numbers

(2017) Michael Liebendörfer: Motivationsentwicklung im Mathematikstudium [development of motivation in the studies of mathematics]

(2019) Abdel Seidouvy: Exploring Student Collaboration during Data Generation in the Statistics Classroom: An inferentialist perspective.

Co-supervision

(2018) Marit Hvalsøe Schou: ABC-Actors at the scene of mathematics. An investigation of how students understand mathematical symbols and formulas in upper secondary (University of Southern Denmark, Odense) finished 2018.

Previous Post Doc

Thomas Janßen: Developing “smart objects” for the learning of Algebra in the MAL Project (Multimodal Algebra Lernen)

Current PhD-projects

Daniela Schansker: Understating place values by the help of digital place value chart, design study. (DeciPlace)

Mareike Best: Flexible use of functions from the teacher's view

Marie-Theres Brehm: Developing risk competency in stochastics education. A Design Project for inclusive settings at secondary level I (Risk-Design), will be conducted in the graduate program „Duale Promotion“

Co-supervision of PhD-students

Giulia Givanna Maria Bini, Mathematical Internet Memes (empirical and theoretical study), University of Torino.

Cecilie Carlson Bach, Relation between Technology use and communication Competency (Aarhus University)

Estela Vallejo-Vargas, Learning to teach through proving: In-service primary school teachers' understanding of proving while engaged in proof-based-teaching (University of Bremen)

Review and supervision of bachelor and master theses

Bachelor theses:

Bianca Blume: Einführung in die negativen Zahlen - ein Schulbuchvergleich [Introduction of negative numbers – a book comparison]

Yvonne Hinrichs: Diagnostische Beschreibung des Lernstandes rechenschwacher Kinder der Klasse 4. [Diagnostic description of the learning state of children with dyscalculia at grade 4]

Jana Holstein: Der Grebe-Punkt [Symmedian Point]

Sarah Schultze: Die Formel von Heron [Heron's Formula]

Staatsexamensarbeiten:

2007

Carmen Schmeier: Fibonacci-Folgen, Entwicklung von Aufgaben zum Entdecken und Problemlösen [Fibonacci sequences – development of tasks for discovery and problem solving]

2008

Julia Cramer: Wissenskonstruktion am Beispiel unendlicher Mengen: Eine empirische Analyse [Knowledge construction on the example of infinite sets: An empirical study]

Inga Niehsner: Mathematische Wissenskonstruktion am Beispiel einer Lernsituation zur Verbindung von arithmetischen und geometrischen Sachverhalten. [Constructing mathematical knowledge on the example of a learning situation connecting arithmetic and geometrical parts]

2009

Alexandra Winkler: Förderung schwacher Schüler in der Algebra [Supporting students in Algebra]

Lisa Lütken: Rechenschwäche und Kompetenzerfahrung – ein Widerspruch? [Dyscalculia and experience of competence – a contradiction?]

Daniela Geils: Beziehungen zu mathematischen Gegenständen am Beispiel der Bruchrechnung [Relations to mathematical objects on the example of fractions]

Claudia Drees: Rekonstruktion des Handlungspotenzials einer Schülerin mit Schwierigkeiten im Bereich Längen-, Flächen- und Volumenberechnung [Reconstructing the potential to act of a student with difficulties in calculating length, area and volume]

Sylvia Döhren: Das Vermeidungsverhalten „schwacher“ Schüler in Mathematik am Beispiel einer Fördersitzung [Avoiding behavior of low achieving students in mathematics on the example of a lesson of support]

Mona Dieckmann: Wiedererkennen als Basishandlung mathematischer Wissenskonstruktion [Recognizing as basic action for the construction of mathematical knowledge]

Master theses

2010

Syrina Laubvogel: Wenn Vorstellungen Prozesse der Wissenskonstruktion stören – Design, Analyse und Evaluation einer Fördersequenz [When imagination disturbs knowledge construction – design, analysis and evaluation of a coaching sequence]

Thomas Janßen: Epistemische Aufbauhandlungen und die Konstruktion mathematischen Wissens. Theoriweiterentwicklung durch Vergleich zweier Modelle [Epistemic actions of the building-type and the construction of mathematical knowledge] (faculty award for the best Master thesis in mathematics education)

Mathias Lihnig: Kugelprojektion - Eine kartographische Anwendung in der Analytischen Geometrie [Globe projection – a cartographical application of Analytical Geometrie]

Christina Radke: Bedingungen, die Lernen in mathematischen Fördersituationen unterstützen oder behindern [Conditions that foster learning in coaching situations]

Jan Käfer: Mit GPS zum Ableitungsbegriff [With GPS towards the derivative]

2011

Jakob Priwitzer: Epistemische Basishandlungen in Modellen zur mathematischen Wissenskonstruktion [Basic epistemic actions in models for the construction of mathematical knowledge] (Faculty award for the best Master thesis in mathematics education)

Tim Haga: Schülerseminar zur tropischen Mathematik: Fördert Forschendes Lernen Interesse? [A student seminar on tropical mathematics – does research based learning foster interest?]

Daniela Hickel: Balance zwischen psychologischen Grundbedürfnissen und Vermeidungsverhalten in einer Fördersequenz zu Dezimalbrüchen [Balance between psychological needs and avoidance in a coaching sequence]

Katharina Witte & Sacha Möller: Wissenskonstruktion in einer Fördersituation zu Dezimalbrüchen [Construction of knowledge in a coaching situation on decimal fractions]

Sina Schierloh: Erkundung der geometrischen Anlage von Kunstwerken M.C. Eschers: Ein Weg zur Förderung des räumlichen Vorstellungsvermögens?“ [Exploring the geometrical approach of the artwork of M.C. Escher: a pathway to foster spatial sense]

Jenny Cramer: Entstehung mathematischer Weltbilder und Motivationslagen – biographisch betrachtet [Development of epistemological beliefs and motivation – regarded from a biographical view]

2012

Ron Dygas: Typische Situationsverhaftungen in einer Fördersituation zu Dezimalbrüchen [Types of situation bonds in a support situation of decimal fractions]

Alena Brandt und Martina Penner: Der epistemologisch mathematische Blick in Aktion [the epistemological and mathematical view in action] (Faculty award for the best Master thesis in Mathematics education)

Franziska Janning: Bildungsbiographische Brüche vor dem Hintergrund erfolgreicher Bildungsbiographien im Fach Mathematik [fractions in biographical formation on the background of successful biographical formation in the subject of mathematics]

Sylvia Reiners, Algebraischer Struktursinn [Algebraic structure sense].

2013

Sina Vogt: Emergente Aufgaben im Mathematikunterricht: Merkmale und Entstehungsbedingungen [Emergent Tasks: Features and conditions for their emergence] (Award of the Faculty for the best and outstanding Master Thesis in Master of Education in Mathematics)

Daniela Behrens: Mathematische Erkenntnis durch Gesten erlangen und teilen [achieving and sharing mathematical knowledge through gesturing]

2014

Co-review: Daniela Rott: Einfluss von Alltagserfahrungen von Schülerinnen und Schülern beim Problem der abgebrochenen Partie [Students' everyday experience and the problem of points] (co-review)

Oliver Hansen: Das Modell der Relationsgraphen und seine Anwendung als Diagnosemittel [the model of relational graphs and its application as a diagnostic tool]

2015

Dirk Thode: Funktionale Zusammenhänge grafisch darstellen: Eine Fallstudie mit Lernenden der Qualifikationsphase [Representing functional relationships graphically: A case study with students from grade 12]

Mirco Motzkus: Eine geometrische Einführung der lokalen Änderungsrate [A geometrical introduction of the rate of change]

Co-review: Daniel Chwatinski: Erwartungen und Anforderungen einer einführenden Mathematikdidaktik-Veranstaltung aus Sicht der Studierenden: Eine empirische Erkundung [Expectations and affordances of a lecture on mathematics education from the students' view: An empirical exploration]

2017

Maik Suhrhoff, Welche Praxeologien verwenden Lehrer*inne und Lehrer beim Unterrichten des Funktionsbegriffs in der Sekundarstufe I der Oberschule [Which praxeologies do teachers use in their lessons on functions at lower secondary level of the "Oberschule"]

Steffen Lühring, Janina Neukirch, Valentin Wolf: three connected Master theses on: Flexibilität im Umgang mit Funktionen [flexibility in dealing with functions]. This Master Thesis was awarded twice: the prize for the best design study in teacher education at the University of Bremen 2017, and it was awarded a prize for the best and outstanding Master Thesis 2017 in the category of Master of Education in Mathematics Education)

Charis Peter: Mathematik fachfremd unterrichten. Lehrer-Schüler-Interaktion in der Zone der nächsten Entwicklung [Out of field teaching in mathematics. Teacher student interaction in the zone of proximal development]

2018

Silja Burghart: Ein Komplementäres Scaffolding-Design: Erweiterung des dezimalen Stellenwertsystems von den natürlichen Zahlen zu den Dezimalbrüchen mit einem Design-Based-Research-Ansatz [Expanding the decimal place value system from natural numbers to decimal numbers with a Design-Based research approach]

Sebastian Prüfer: Computer vs. Stift und Papier als Werkzeuge zum kooperativen Problemlösen im Fach Mathematik [Computer vs. pen and paper as tools for collaborative problem solving in mathematics]

(Co-review) Bernd Horstkamp: Möglichkeiten und Grenzen eines textreduzierten Diagnoseinstrumentes zur Leitidee Funktionaler Zusammenhang [Possibilities and limitations of a text reduced diagnostic instrument for functional relations].

(Co-review, Information technology): Stefan Bollen: Tangible Design zum Algebra Lernen am Tablet. Ein Vergleich einer indirekten Tangible Eingabe mit einer Multi-Touch Eingabe

2020

(Co-review) Fabienne Wahner: Repräsentationsebenen in Argumentationen von Lernenden der 8. Klassen im Übergang von Arithmetik zur Algebra [levels of representation in argumentation von learners of Grade 8 in the transition from arithmetic to algebra]

(Co-review) Dennis Zarnowski: Argumentation in Vorstellungsentwicklungsprozessen von Schülerinnen und Schülern in empirischen Zugängen zur Wahrscheinlichkeit. [Argumentation in imaginary processes of students within empirical approaches to probability]

(Co-review) Luca Raimondo (Bachelor thesis), Cooperation with Prof. Malaka (Digitale Medien): Solving Strategies with Algebra Tiles: An Investigation of Occuring patterns

2021

Jonas Brinkmann: Comparing a virtual and a face-to-face learning environment using Geogebra to introduce trigonometric functions.

2022

Gian-Luca Woynowski: Mathematische Internet-Memes in der Oberstufe: Wissenskonstruktion in Designprozessen [Mathematical Internet Memes in High School: Knowledge Construction in Design Processes]

2023

Stephan Schott: Curriculum development of a series of lessons on linear functions. An action research design study.

Some main contributions as service to the field

Reviewing:

- Expert for task development at the IQB (Institute for the quality development in the educational system of Germany): 2010-2012
- Member of the Editorial Board of the ESM since 2015
- Occasional Reviewer for
 - ZDM-International Research Journal
 - JMD (Journal für Mathematik-Didaktik)
 - Mathematica didactica
 - NOMAD (Nordic studies in Mathematics Education)
 - DEME (Digital Experience in Mathematics Education)
 - MTL (Mathematical Thinking and Learning)
 - International Journal of Science and Mathematics Education
 - Research in Mathematics Education
 - FLM (For the learning of Mathematics)
 - PME (international Group for the Psychology on Mathematics Education), CERME regularly, for PhD defenses and for further needs in the field.
 - also for books and conferences such as ICMT, ICME, GDM, ECER, RPME (Moscow, see below).

Responsibilities as expert and chair

Abbreviations:

CERME: Conference of the European Society for Research in Mathematics Education

YESS: Young ERME Summer School

YERME: Young ERME

ICME: International Congress on Mathematics Education

ICTMT: International Conference on Teaching Mathematics with Technology

GDM: Gesellschaft für Didaktik er Mathematik

- Expert at GDM- summer school, IPN, Kiel (2011), of the Early Career day of ICME 13 (2016), YERME-day of CERME 10 (2017), CERME 11 (2019), CERME 11 ¼ and CERME12 (2021)
- Expert of the Working Group on Theories, linguistic and representation aspects of the Summer Schools YESS 8, YESS 9 (member of the IPC), YESS 10 (member of the IPC), YESS11 (member of the IPC), YESS 12 (discussion group).
- 2015: Organizing the GDM-Summer school at the University of Bremen
- 2011-2014: Referee für das Nationale Italienische Begutachtungssystem CINECA
- 2012: Co-chair for the ICME12-TSG on theoretical perspectives
- 2016: Chair of the symposium on German traditions with a focus on theories of ICME 13, Hamburg.
- 2012-2017: Member of the Local Organizing Committee of ICME 13, Hamburg.
- 2018-2019: Member of the Organizing Committee of the Regional Conference of PME in Moscow "Technology and Psychology for Mathematics Education" set up by PME and Yandex (March 2919)
- 2020: Chair of the Topic Study Group on theoretical perspectives at ICME 14, Shanghai (postponed, 2021)

- Co-chair of CERME 7, chair of CERME 10 (2017), CERME 11 (2019), CERME11 ¼ (2020), CERME 12 (2022) on the Thematic Working Groups (on theoretical perspectives).
- 2020: Workshop on Design-Based Research (online) for the Graduate program of the University of Rostock.
- From 2021 on I will serve as a senior fellow to support the students in the graduate program of the “Duale Promotion” with my expertise on design-Based research.

Transfer service

- Expert in the commission for the final exam at middle school level in the land of Bremen (2009-2018)
- Responsible for DZLM (Deutsches Zentrum für Lehrerbildung Mathematik) for the land of Bremen (Länderkoordinatorin DZLM, 2008-2018)
- Support on task design for national institute on quality management of the educational system (IQB, (2010-2012)
- Research days for pupils in the *matelier* (<https://www.uni-bremen.de/matelier>)
- Professional development of teachers

Transfer: Förderung und Fortbildung (eine Auswahl)

a) Schülerförderung

1. Kinder-Uni 2008, 2011, 2014 (Archäologische Mathematikwerkstatt), 2012 Würfel basteln, 2013, (Thomas Janßen und Ole Eley) Fußbälle
2. Mathe-Camp: Förderung rechenschwacher Kinder einer Oberschule in Bremen (2009, 2010, 2011, 2012)
3. Schülerseminar für talentierte und interessierte Schülerinnen und Schüler: Forschen in der Mathematik, Einblicke in die tropische Geometrie (Herbst 2010, Masterarbeit von Tim Haga in Kooperation mit Prof. Eva Feichtner)
4. Vorbereitende Begleitung des Projekts Matheforscher der Stiftung Rechnen für den Raum Bremen, an dem zwei Bremer Oberschulen beteiligt sind.
5. Forschertage: Angebot für Schulklassen 5,6 im *matelier* (laufendes Angebot seit 2012, das von Studierenden durchgeführt wird)
6. Mathematikwerkstatt: Ein Angebot für Leistungskurse von Studierenden aus dem Projekt Forschenden Lernens (2012-2015)
7. Termwerkstatt, Entwicklung mit Ole Eley (2012, 2013), aktuell: in Kooperation mit Prof. Knipping: Überarbeitung mit Studierenden zu einem Onlineangebot (2020-now)

b) Lehrerfort- und Weiterbildung:

1. Sommer-Uni 2009: Arbeiten mit dem Bildungsplan in der Qualifikationsphase und Stochastik experimentell.
2. 2009: Professional Development zum Umgang mit dem Bildungsplan mit Materialien.
3. Förderung mathematischer Begabungen (2006-2009)
4. 2011/2012/2013/2014: Professional Development: im Rahmen der Offensive Bildungsstandards (Konstruktion guter Aufgaben, Sprache und Mathematiklernen, Basiskompetenzen fördern)
5. 2011: Förderung von mathematisch interessierten und begabten Kindern - ein Fortbildungsangebot
6. 2011-2015: Forschenden Lernen in der math. Lehrerbildung
7. (2012/2013) Professional Development: Sinus NRW in Essen zur Förderung von interessendichten Situationen in der Sekundarstufe II
8. (2012-2015) Fortbildung von Moderatoren (Thema: Fortbildung von Lehrkräften ohne Mathematikstudium) in Bayern (DZLM Angebot)
9. Fortbildungen im MAL-Projekt (Kiel, Bremen, Landshut: 2016-2019)
10. MNU Hamburg, 2017, Vortrag zum inklusiven Mathematikunterricht
11. 2017-2019: Lehrerfortbildung in Bremen im *matelier*, im Rahmen von Maffunt (Math. für fachfremd unterrichtende Lehrkräfte)
12. Fortbildung MNU 2019 (Workshop), zum Multimodalen Algebra Lernen mit dem MAL-System.
13. 2021 (September) Fachtag für Fachleitungen Mathematik zum Thema Formeln sehen.
14. 2022, (März) Fortbildung mit Fachleiter Mathematik zur Referendarausbildung zum Thema: Formeln sehen.

c) Praxisprojekte

Mathematik-Kalender (zusammen mit Gerd Walther, Kiel):

13 Kinder-Poster eines bundesweiten Posterwettbewerbs wurden vom Friedrich-Verlag für einen (immerwährenden) Kalender zum Jahr 2000 ausgewählt. Für diesen Kalender habe ich zusammen mit Prof. Gerd Walther (Universität Kiel) Mathematikaufgaben rund um das Thema Kalender entworfen, die vielfältige Zugänge zu diesem Sachgegenstand und zu seinen Wurzeln in verschiedenen Fachbereichen eröffnen. Die 12 thematisch ausgerichteten Aufgabengruppen z.B. zum Freitag den 13., zu den kirchlichen Festen oder zu Mond- und Sonnenjahr und der Informationstext sind auch als didaktische Anregung für fächerübergreifende Projekte gemeint, in denen ein Sachgegenstand aus historischer, kultureller, religiöser, physikalischer und mathematischer Sicht betrachtet wird.

Mathematik inszenieren: Anlässlich des weltweiten mathematischen Jahres veranstaltete das Institut für Mathematik und ihre Didaktik zusammen mit der PHÄNOMENTA einen Wettbewerb für Schulklassen und Projektgruppen in Schleswig-Holstein. Im Oktober 2000 war das Mathematik-Museum (Beutelspacher, Gießen) drei Wochen in der PHÄNOMENTA zu Gast. Während dieser Zeit fand die Jurierung von Wettbewerbsbeiträgen eines Klassen- und Projektgruppenwettbewerbs statt und ergänzend dazu eine Vortragsreihe zu mathematikbezogenen Themen.

Curriculumentwicklung: Entwicklung des Bildungsplans in einer Arbeitsgruppe bestehend aus Lehrkräften, einem Vertreter des LIS und MathematikdidaktikerInnen.

Matelier: (in Kooperation mit Prof. Dagmar Bönig (FB12 der Universität Bremen) Aufbau eines didaktischen Zentrums an der Universität Bremen, finanziert durch die Bildungsbehörde des Landes Bremen (Senatorin), die Universität Bremen und den Fachbereich 03 für Mathematik. Das Matelier ist ein Raum im MZH (2495), der ein breites Spektrum didaktischen Materials für Studierende und Lehrkräfte bereithält (seit 2011):

<http://www.matelier.uni-bremen.de>

Forschendes Lernen in der Lehrerbildung: FL wurde sowohl in der fachwissenschaftlichen als auch in der fachdidaktischen Lehre eingesetzt, und zwar sehr früh im Studium. In Mathematik im Rahmen eine Vertiefungsveranstaltung in der Analysis und der Linearen Algebra (seit 2011, dafür wurde eine Lektorenstelle finanziert) und in der Mathematikdidaktik im Praxissemester in Form von Design Research (2011-2018).

Lehrprojekt zum Diagnostizieren und Fördern in der Arithmetik und Algebra: Ein Praxisprojekt mit Studierenden und einer Schule in Bremen (2008 - 2012). Studierende wurden im Diagnostizieren in der Arithmetik und Algebra ausgebildet. Es wurde diagnostisches Material entwickelt, das dann in einem einwöchigen Projekt mit Schülerinnen und Schüler eingesetzt wurde, um diese Schülerinnen und Schüler anschließend zu fördern.

Aktiv mit Lehrvideos lernen (ALLE) ist ein Lehrprojekt. Im Rahmen der Ausschreibung „win a tutor“ waren zwei Tutor*innen eingestellt worden, um fachdidaktische Lehrvideos für flipped-Classroom-Szenarien zu erstellen und zu erproben (2017-2018).