


Dr. Daniela Fiedler

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Department of Biology Education
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Personal Profile

- 09/2018: Received doctorate Dr. rer. nat. (magna cum laude)
- Research interests: Teaching and learning evolution focusing on statistical reasoning, conceptions, and attitudes as well as dynamic representations as teaching-learning material

Research Experience

- since 08/2018 **Research Scientist** (Postdoc)
Research and project activities, university teaching
Department of Biology Education (Head: Professor Dr. Ute Harms)
IPN – Leibniz Institute for Science and Mathematics Education, Kiel
- 01/2019 – 03/2019 **Visiting Scholar** (12 weeks), Linköping University (Sweden),
Department Science and Technology
Host: Prof. Dr. Lena A. E. Tibell
- 04/2017 – 06/2017 **Visiting Scholar** (8 weeks), Stony Brook University (NY, USA),
Department of Ecology & Evolution
Host: Professor Ross H. Nehm (Ph.D. in Science Education)
- 08/2014 – 08/2018 **Research Scientist** (Doctoral student)
Research activities in the project „*Challenging Threshold Concepts in Life Science – enhancing understanding of evolution by visualization*”
Department of Biology Education (Head: Professor Dr. Ute Harms)
IPN – Leibniz Institute for Science and Mathematics Education, Kiel

Education

- 08/2014 – 09/2018 **Doctor of Science** (Dr. rer. nat.; magna cum laude)
Kiel University, Germany
Day of disputation: 28.06.2018
Title: Relevance of threshold concepts for understanding evolution
Supervisor: Professor Dr. Ute Harms
- 10/2011 – 12/2013 **MSc in Biology**
Justus-Liebig-University Giessen, Germany
- 10/2008 – 10/2011 **BSc in Biology**
Justus-Liebig-University Giessen, Germany

Grants and Awards

- 03/2020 **DAAD Travel Grant** for conference trip NARST Annual International Conference, Portland, OR, USA
Amount: 2.431€
withdrawal from the fellowship due to conference cancellation
- 09/2019 **DAAD Travel Grant** for conference trip Internationale Jahrestagung der Gesellschaft für Didaktik der Chemie und Physik (GDGP) und der Fachsektion Didaktik der Biologie (FDdB im VBio), Vienna, Austria
Amount: 659€
- 04/2018 **DAAD Travel Grant** for conference trip NARST Annual International Conference, Atlanta, GA, USA
Amount: 1.684€
- 04/2017 – 06/2017 **ESERA Early Career Research Travel Award** to support the research stay at Stony Brook University, NY, USA
Amount: 1.000€

Committee Work and Academic Self-Administration

- since 04/2019 Member in the Scientific Committee (Wissenschaftsausschuss, WA), IPN – Leibniz Institute for Science and Mathematics Education, Kiel
- 11/2019 – 05/2020 Representative of mid-level faculty in the appointment committee for the W2 professorship Biology Education, Kiel University

Commitment and Other Roles

- since 11/2020 Member of the working group „Postdoc Survey“ of the Leibniz Postdoc Network within the Leibniz Association
- 04/2019 – 12/2020 Co –Team leader of the working area “Waste Prevention” within the working group „Climate Protection and Sustainability“ [Klimaschutz und Nachhaltigkeit, KliN@IPN], IPN – Leibniz Institute for Science and Mathematics Education, Kiel

Review for Journals and Conferences

Journals

CBE – Life Sciences Education (2), Evolution: Education and Outreach (2), ZfDN - Zeitschrift für Didaktik der Naturwissenschaften (1), Instructional Sciences (1), Learning and Individual Differences (1)

Conferences & Proceedings

National Association for Research in Science Teaching (NARST 2020, conference)
European Researchers in Didactics of Biology (ERIDOB 2020, conference and proceedings)
European Science Education Research Association (ESERA 2021, conference)

Memberships

European Science Education Research Association (ESERA)

National Association for Research in Science Teaching (NARST)

Verband Biologie, Biowissenschaften & Biomedizin in Deutschland (VBio) inklusive
Fachsektion Didaktik der Biologie (FDdB)

Publications

Peer-reviewed journal articles

- A9 Bruckermann, T., Fiedler, D., & Harms, U. (2021). Identifying precursory concepts in evolution during early childhood – a systematic literature review. *Studies in Science Education*, 57(1), 85–127. <https://doi.org/10.1080/03057267.2020.1792678>
- A8 Göransson, A., Orraryd, D., Fiedler, D., & Tibell, L. A. E. (2020). Conceptual characterization of threshold concepts in student explanations of evolution by natural selection and effects of item context. *CBE – Life Sciences Education*, 19(1), Article ar1. <https://doi.org/10.1187/cbe.19-03-0056>
- A7 Hoffmann, U. S., Jauker, F., Diehl, E., Mader, V. L., Fiedler, D., Wolters, V., & Diekötter, T. (2020). The suitability of sown wildflower strips as hunting grounds for spider-hunting wasps of the genus *Trypoxylon* depends on landscape context. *Journal of Insect Conservation*, 24(1), 125–131. <https://doi.org/10.1007/s10841-019-00190-6>
- A6 Fiedler, D., Sbeglia, G. C., Nehm, R. H., & Harms, U. (2019). How strongly does statistical reasoning influence knowledge and acceptance of evolution? *Journal of Research in Science Teaching*, 56(9), 1183–1206. <https://doi.org/10.1002/tea.21547>
- A5 Fiedler, D., Tröbst, S., Großschedl, J., & Harms, U. (2018). EvoSketch: Simple simulations for learning random and probabilistic processes in evolution, and effects of instructional support on learners' conceptual knowledge. *Evolution: Education and Outreach*, 11, Article 15. <https://doi.org/10.1186/s12052-018-0089-3>
- A4 Karp, D. S., Chaplin-Kramer, R., Meehan, T. D., Martin, E. A., DeClerck, F., Grab, H., Gratton, C., Hunt, L., Larsen, A. E., Martínez-Salinas, A., O'Rourke, M. E., Rusch, A., Poveda, K., Jonsson, M., Rosenheim, J. A., Schellhorn, N. A., Tschardt, T., Wratten, S. D., ..., Fiedler, D., ..., Zou, Y. (2018). Crop pests and predators exhibit inconsistent responses to surrounding landscape composition. *Proceedings of the National Academy of Sciences of the United States of America*, 115(33), E7863–E7870. <https://doi.org/10.1073/pnas.1800042115>
- A3 Fiedler, D., Tröbst, S., & Harms, U. (2017). University students' conceptual knowledge of randomness and probability in the context of evolution and mathematics. *CBE-Life Sciences Education*, 16(2), Article ar38. <https://doi.org/10.1187/cbe.16-07-0230>
- A2 Mader, V., Diehl, E., Fiedler, D., Thorn, S., Wolters, V., & Birkhofer, K. (2017). Trade-offs in arthropod conservation between productive and non-productive agri-environmental schemes along a landscape complexity gradient. *Insect Conservation and Diversity*, 10(3), 236–247. <https://doi.org/10.1111/icad.12220>

- A1 Mader, V., Birkhofer, K., Fiedler, D., Thorn, S., Wolters, V., & Diehl, E. (2016). Land use at different spatial scales alters the functional role of web-building spiders in arthropod food-webs. *Agriculture, Ecosystems and Environment*, 219, 152–162. <https://doi.org/10.1016/j.agee.2015.12.017>

Peer-reviewed articles in conference proceedings

- B1 Fiedler, D., & Harms, U. (2016). Die Bedeutung eines Begriffs von Zufall und Wahrscheinlichkeit für das Evolutionsverständnis – Pilotstudie zur Entwicklung eines Testinstruments [The relevance of the concepts randomness and probability for the understanding of evolution – a pilot study for the development of a test instrument]. In U. Gebhardt & M. Hammann (Hrsg.), *Lehr- und Lernforschung in der Biologiedidaktik* (Vol. 7, S. 95–105). Studienverlag

Book chapters

- C1 Harms, U., & Fiedler, D. (2019). Improving student understanding of randomness and probability to support learning about evolution. In: U. Harms & M. J. Reiss (Hrsg.), *Evolution Education Re-considered* (S. 271–283). Springer International Publishing. https://doi.org/10.1007/978-3-030-14698-6_15

Dissertation and theses

- D3 Fiedler, D. (2018). Relevance of threshold concepts for understanding evolution (Doctoral dissertation, Kiel University, MACAU. https://macau.uni-kiel.de/receive/dissertation_diss_00023875)
- D2 Fiedler, D. (2014). Effects of management type and landscape diversity on web-building spiders and their prey (unpublished master's thesis). Justus-Liebig-University Giessen.
- D1 Fiedler, D. (2011). Untersuchung des Besucherverhaltens im "Katzenschungel" des Zoologischen Gartens Frankfurt am Main [Investigation of visitors' behavior in the 'Katzenschungel' of the Zoological Garden Frankfurt am Main] (unpublished bachelor's thesis). Justus-Liebig-University Giessen.

Others

- E1 Fiedler, D., & Harms, U. (2018). Sind die Testaufgaben zu leicht oder zu schwer? Eine Wright-Map, in sechs Schritten erklärt [Are the test items too easy or too difficult? A Wright-Map, explained in six steps]. *IPN Journal*, 3(1), 24–25. https://www.ipn.uni-kiel.de/de/publikationen/ipn-journal/IPNJournal_No3.pdf

Presentations

Invited talks

- F1 Fiedler, D. (01/2019). The relevance of statistical reasoning for evolution education. Media and Information Technology Seminar, Linköping University, Sweden.

Presentations at conferences and workshops

- G11** Fiedler, D., Seidel, R., & Harms, U. (09/2020). Representation of evolutionary trees in biology school textbooks – Development and application of a classification system. 13. Conference of European Researchers in Didactics of Biology (ERIDOB), Nicosia, Cyprus [Conference cancelled]
- G10** Fiedler, D., Rösberg, I. K., Rodemer, M., Heyduck, B., & Harms, U. (03/2020). Plant Blindness – What do German high school students and in-service biology teachers „see“ in evolution education? In A. Yarden (Chair), Learning and teaching evolution in high school: Challenges and possible remedies (Symposium). NARST Annual International Conference, Portland, OR, USA. [Conference cancelled]
- G9** Fiedler, D., Göransson, A., & Tibell, L. A. E. (09/2019). Wie verwenden Studierende der Biologie Schwellenkonzepte bei der Erklärung der natürlichen Selektion? In U. Harms & D. Fiedler (Chairs), Wissen über und Umgang mit Vorstellungen zur biologischen Evolution – Studien aus der Lehrerverforschung (Symposium). Internationale Tagung der Gesellschaft für Physik und Chemie (GDPC) und der Fachsektion Didaktik der Biologie (FDdB im VBio), Vienna, Austria
- G8** Fiedler, D. (09/2019). Evolution ist kontrainuitiv! – Zu Problemen von Schülerinnen und Schülern im Umgang mit Zufall und Wahrscheinlichkeit im Kontext Evolution [Evolution is contrainuitive! - Problems of pupils when dealing with randomness and probability in the context of evolution]. MNU-Tagung, Kiel, Germany
- G7** Fiedler, D. (Chair). (08/2019). Factors influencing teaching, learning, and accepting evolution (Symposium). 13. Conference of European Science Education Research Association (ESERA), Bologna, Italy.
- G6** Fiedler, D., & Harms, U. (07/2018). Simulation EvoSketch: Learning randomness and probability in evolution. In U. Harms & L. A. E. Tibell (Chairs), Understanding and acceptance of evolution in the light of threshold concepts (Symposium). 12. Conference of European Researchers in Didactics of Biology (ERIDOB), Saragossa, Spain.
- G5** Nehm, R. H.*, Fiedler, D.*, Sbeglia, G. C., & Harms, U. (07/2018). Knowledge of randomness and probability as predictors for understanding and acceptance of evolution. In U. Harms & L. A. E. Tibell (Chairs), Understanding and acceptance of evolution in the light of threshold concepts (Symposium). 12. Conference of European Researchers in Didactics of Biology (ERIDOB), Saragossa, Spain. *Shared presentation
- G4** Fiedler, D. (07/2018). Warum ist das Leben so vielfältig? [Why is life so diverse?] Science Show at Kiel Week, Kiel.
- G3** Fiedler, D., Nehm, R. H., Sbeglia, G. C., & Harms, U. (03/2018). The role of statistical thinking in learning, understanding, and accepting evolution. NARST Annual International Conference, Atlanta, GA, USA.
- G2** Fiedler, D., & Harms, U. (09/2017). Evolution lernen mit der Simulation EvoSketch [Learning evolution with the simulation EvoSketch]. In U. Harms (Chair), Evolution Lernen – Barrieren und Fördermaßnahmen (Symposium). 21. Internationale Tagung der Fachsektion Didaktik der Biologie (FDdB im VBio), Halle, Germany
- G1** Fiedler, D., & Harms, U. (09/2016). How to measure students' understanding of randomness and probability in the context of evolution. 11. Conference of European Researchers in Didactics of Biology (ERIDOB), Karlstad, Sweden.

Poster presentations at conferences

- H4** Fiedler, D., Sbeglia, G. C., Harms, U., & Nehm, R. H. (03/2020). Concepts of randomness, probability, and temporal scales in novices' and experts' evolutionary explanations. NARST Annual International Conference, Portland, OR, USA. [Conference cancelled]
- H3** Chakraverty, D., Fiedler, D.*, & Harms, U. (09/2016). Instructional support for learning concepts in evolution with visualizations. 11. Conference of European Researchers in Didactics of Biology (ERIDOB), Karlstad, Sweden. *Presenter
- H2** Fiedler, D., & Harms, U. (03/2016). Ist das konzeptuelle Wissen über die Konzepte Zufall und Wahrscheinlichkeit Voraussetzung für das konzeptuelle Wissen über Evolution? [Is conceptual knowledge of randomness and probability prerequisite for conceptual knowledge of evolution?]. 4. Jährliche Tagung der Gesellschaft für Empirische Bildungsforschung (GEBF), Berlin, Germany
- H1** Fiedler, D., & Harms, U. (09/2015). Die Bedeutung von Zufall und Wahrscheinlichkeit für das Evolutionsverständnis - Ergebnisse der Pilotstudie [Relevance of randomness and probability for understanding evolution – Results of a pilot study]. 20. Internationale Tagung der Fachsektion Didaktik der Biologie (FDdB im VBio), Hamburg, Germany

Teaching*Teaching activities as part of university education*

- WiSe 2020/21 Theoretische und empirisch fundierte Konzeption und Gestaltung von Biologieunterricht, IPN-biol-FD3-PrUe (4 SWS, Praktische Übung, MEd Lehramt, Belegnr. 500005/500028/500044)
gemeinsam mit Dr. Carola Garrecht, Dr. Hanno Michel & Dr. Sebastian Opitz
- SoSe 2020 Evolution als Rahmen und Inhalt des Biologieunterrichts, IPN-biol-FD4 (2 SWS, Seminar, MEd Lehramt, Belegnr. 500036)
- WiSe 2019/20 Theoretische und empirisch fundierte Konzeption und Gestaltung von Biologieunterricht, IPN-biol-FD3-PrUe (4 SWS, Praktische Übung, MEd Lehramt, Belegnr. 500028/500005)
gemeinsam mit Dr. Hanno Michel & Dr. Sebastian Opitz
- SoSe 2019 Evolution als Rahmen und Inhalt des Biologieunterrichts, IPN-biol-FD4 (2 SWS, Seminar, MEd Lehramt, Belegnr. 500061)
- WiSe 2018/19 Theoretische und empirisch fundierte Konzeption und Gestaltung von Biologieunterricht, IPN-biol-FD3 (Vorlesungsververtretung für Prof. Dr. Ute Harms, 2 Vorlesungen, MEd Lehramt)

Mentoring of doctoral students

Isabell K. Rösberg, Supervisor: Professor Dr. Ute Harms, Kiel University
Theme: Learning opportunities to initiate evolution understanding in early education (since 08/2019)

Helena Aptyka, Supervisor: Professor Dr. Jörg Großschedl, University of Cologne
Theme: Learning opportunities in evolution education: Their relevance for students' development of understanding (since 06/2019)

Scientific and methodological advice for theses (completed)

- 4 Förderung des konzeptuellen Evolutionswissens durch eine Museumsführung zum Thema Evolution [Fostering conceptual knowledge of evolution by offering a museum tour on the topic of evolution.], unpublished master's thesis of Maren Weitemeyer (Supervisor: Professor Dr. Ute Harms), Kiel University, 2020
- 3 Analyse phylogenetischer Stammbäume in Biologieschulbüchern: Entwicklung und Anwendung eines Kategoriensystems [Analysis of phylogenetic trees in biology textbooks: Development and application of a category system], unpublished master's thesis of Rieke Seidel (Supervisor: Professor Dr. Ute Harms), Kiel University, 2019 (see presentation [G11](#))
- 2 Zufall und Wahrscheinlichkeit im Biologieunterricht: Entwicklung und Anwendung eines Kategoriensystems [Randomness and probability in biology education: Development and application of a category system], unpublished master's thesis of Maike Nielsen (Supervisor: Professor Dr. Ute Harms), Kiel University, 2019
- 1 Wissen über Zufall und Wahrscheinlichkeit im Kontext der Evolutionstheorie: Weiterentwicklung und Pilotierung eines Wissenstests [Knowledge about randomness and probability in the context of evolutionary theory: Further development and piloting of a knowledge test], unpublished master's thesis of Lena Mehrens (Supervisor: Professor Dr. Ute Harms), Kiel University, 2018