


# Dr. Daniela Fiedler

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Department of Biology Education  
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## Personal Profile

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- 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

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- since 08/2018     **Research Scientist** (Postdoc)  
Research and project activities, 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:* Professor Lena A. E. Tibell (Ph.D. in Biochemistry)
- 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 „*EvoVis: 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

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- 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

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- 03/2020      **DAAD Travel Grant** for conference trip to the 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 to the 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 to the 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

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- since 04/2019      Member in the Scientific Committee (Wissenschaftsausschuss, WA) of 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

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- since 12/2020      Selected mentee for the mentoring program “via:mento” of the Kiel University
- since 11/2020      Member of the working group „Postdoc Survey“ of the Leibniz Postdoc Network, 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

## Memberships

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- European Science Education Research Association (ESERA)
- National Association for Research in Science Teaching (NARST)
- Society for the Advancement of Biology Education Research (SABER)
- Verband Biologie, Biowissenschaften & Biomedizin in Deutschland (VBIO) inklusive Fachsektion Didaktik der Biologie (FDdB)

## Review for Journals and Conferences

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### Journals

CBE – Life Sciences Education, Evolution: Education and Outreach, Instructional Sciences, Journal of Biological Education, Learning and Individual Differences, PlosONE, Zeitschrift für Didaktik der Naturwissenschaften

### Conferences & Proceedings

Fachsektion Didaktik der Biologie (FDdB) im VBIO (2021, conference)  
European Science Education Research Association (ESERA 2021, conference)  
European Researchers in Didactics of Biology (ERIDOB 2020, conference and proceedings)  
National Association for Research in Science Teaching (NARST 2020, conference)

## Publications

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### 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., Tschardtke, 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](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](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

- E2 Fiedler, D., & Harms, U. (2021). Dem Unsichtbaren auf der Spur: Wie die Fähigkeit zu statistischem Denken mit Evolutionswissen zusammenhängt und inwieweit Visualisierungen helfen können, Evolution zu verstehen [Tracing the invisible: The relationship of statistical reasoning with evolutionary knowledge and the potential of visualizations for understanding evolution]. *IPN Journal*, 8(1), 9–14. [https://www.ipn.uni-kiel.de/de/publikationen/ipn-journal/IPN\\_Journal\\_Nr8web.pdf](https://www.ipn.uni-kiel.de/de/publikationen/ipn-journal/IPN_Journal_Nr8web.pdf)

- 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](https://www.ipn.uni-kiel.de/de/publikationen/ipn-journal/IPNJournal_No3.pdf)

## Presentations

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### *Invited talks*

- F2 Fiedler, D. (03/2021). Evolutionsbiologische Kompetenz im Biologieunterricht stärken [Enhancing evolutionary literacy in biology instruction]. Research talk as part of the interviews for the W1 Junior Professorship Didactics of Biology, University of Münster
- 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 Lehrerprofessionsforschung (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, Germany.
- 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. (presenter), & 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.
- 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 & Mentoring**

#### *Teaching activities as part of university education (pre-service science teacher education)*

- SoSe 2021 IPN-biol-FD4: Evolution als Rahmen und Inhalt des Biologieunterrichts [Evolution as a framework and content of biology teaching] (2 SWS, Seminar, Master of Education, 500036)
- WiSe 2020/21 IPN-biol-FD3-PrUe: Theoretische und empirisch fundierte Konzeption und Gestaltung von Biologieunterricht [Theoretical and empirically based conceptualization and structuring of biology instructions] (4 SWS, Practical exercise, Master of Education, 500005/500028/500044)  
Together with: Dr. Carola Garrecht, Dr. Hanno Michel, Dr. Sebastian Opitz

- SoSe 2020 IPN-biol-FD4: Evolution als Rahmen und Inhalt des Biologieunterrichts [Evolution as a framework and content of biology teaching] (2 SWS, Seminar, Master of Education, 500036)
- WiSe 2019/20 IPN-biol-FD3-PrUe: Theoretische und empirisch fundierte Konzeption und Gestaltung von Biologieunterricht [Theoretical and empirically based conceptualization and structuring of biology instructions] (4 SWS, Practical exercise, Master of Education, 500005/500028)  
Together with: Dr. Hanno Michel, Dr. Sebastian Opitz
- SoSe 2019 IPN-biol-FD4: Evolution als Rahmen und Inhalt des Biologieunterrichts [Evolution as a framework and content of biology teaching] (2 SWS, Seminar, Master of Education, 500061)
- WiSe 2018/19 IPN-biol-FD3: Theoretische und empirisch fundierte Konzeption und Gestaltung von Biologieunterricht [Theoretical and empirically based conceptualization and structuring of biology instructions] (2 lectures, Master of Education)

#### *Mentoring of doctoral students*

**Berrit Czinczel**, Supervisor: Professor Dr. Ute Harms, Kiel University (since 05/2021)

**Isabell K. Adler**, 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' knowledge development (since 06/2019)

#### *Scientific and methodological advice for master's thesis (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