

Sarah B. Boesdorfer

Director of Chemistry Teacher Education
Associate Professor, Chemistry Education
Illinois State University, Department of Chemistry

Education

Ed. D., Illinois State University	Curriculum & Instruction	Aug. 2012
M.S., University of Wisconsin at Madison	Curriculum & Instruction	Dec. 2003
B.S., University of Illinois Urbana-Champaign	Chemistry	May 2002

Leadership Experience

Secondary and K12 Teacher Education Program Liaison	8/2021 - Present
Co-Chair University Teacher Education Assessment Committee (UTEAC)	8/2021 - Present
Co-Editor <i>Innovations in Science Teacher Education</i> Journal	1/2021 - Present
Director of Chemistry Education	8/2015 - Present
Learning Community Leader, Faculty Fellow, CTLT	1/2019 - Present

Teaching Experiences

Illinois State University	8/2015- Present
CHE 110: Fundamentals of Chemistry	
CHE 161: Introduction to Secondary Science Teaching	
CHE 301: Teaching of Chemistry	
CHE 302: Student Teaching and Professional Seminar	
CHE 401: Advanced Chemistry Demonstrations	
CHE 403: Teaching Chemistry Safely	
CHE 481/ 482: Capstone Research I and II	
TCH 247: Science Inquiry for Elementary Teachers	
TCH 257: Science Methods	
University of Northern Iowa, Cedar Falls, IA	8/2012- 7/2015
General Chemistry, Physical Science, Science Methods, Undergraduate Research, and Science Education Graduate Courses	
Parkland College, Champaign, IL	
Chem 100: Introduction to Chemistry,	10/2011 – 12/2011
Illinois State University, Normal, IL	
C&I 257: Elementary Science Methods	8/2009- 12/2009
Mt. Zion High School, Mt Zion, IL	
Chemistry/Environmental Science Teacher	8/2006- 5/2008

Publications ^u = Undergraduate, ^g = Graduate Student

- Burt, M.B.^g & Boesdorfer, S.B. (2021). The implementation of reform-based standards in high school chemistry classrooms influenced by science teaching orientations. *Electronic Journal for Research in Science & Mathematics Education*, 25(1), 71-92.
- Bremert, H.^g & Boesdorfer, S. B. (2021). Collaborative testing impacts student achievement and test anxiety for Advanced Placement environmental science students. *Journal of Teacher Action Research*, 7(3), 66-86.
- Boesdorfer, S.B. & Del Carlo, D. I. (2020). Refocusing outcome expectations for secondary and postsecondary chemistry classrooms. *Journal of Chemical Education*, 97(11), 3919–3922. DOI: 10.1021/acs.jchemed.0c00689
- Boesdorfer, S.B. & Daugherty, J.^g (2020). Using criteria-based digital badging in high school chemistry unit to improve student learning. *Journal of Science Education and Technology*, 29(3), 421-430. DOI: 10.1007/s10956-020-09827-7
- Boesdorfer, S.B., Del Carlo, D.I., & Wayson, J.^u (2020). Secondary science teachers' definition and use of data in their teaching practice. *Research in Science Education*. DOI: 10.1007/s11165-020-09936-8
- Bennett, T.^g & Boesdorfer, S.B. (2020). Coupling PhET simulations and POGIL: High school chemistry students' learning and engagement in argumentation on the topic of atomic theory. *Journal of Teacher Action Research*, 6(2), 26-53.
- Bremert, H.^g, Stoff, A.^g & Boesdorfer, S.B. (2020). Collaborative assessments: Learning science and collaborative skills during summative testing. *The Science Teacher*, 87(9), 32-37.
- Boesdorfer, S.B., Arias, A.M., Mull, B.^u, & Lieberum, K.^u (2020). The availability and quality of existing curriculum materials to support NGSS-aligned engineering instruction in chemistry teaching. *School Science and Mathematics*, 120(7), 425-440. DOI:10.1111/ssm.12431
- Boesdorfer, S. B. (2019). Advancing professional knowledge and skills for chemistry teaching through an online master's degree for secondary-level chemistry teachers. In S. B. Boesdorfer, ed., *Best Practices in Chemistry Teacher Education* (pp. 53-66). American Chemical Society: Washington D.C. DOI:10.1021/bk-2019-1335.ch005
- Boesdorfer, S. B. (2019). Growing teachers and improving chemistry learning: *How Best Practices in Chemistry Teacher Education* can enhance chemistry education. In S. B. Boesdorfer, ed., *Best Practices in Chemistry Teacher Education* (pp. 1-6). American Chemical Society: Washington D.C. DOI: 10.1021/bk-2019-1335.ch001
- Boesdorfer, S.B., Del Carlo, D.I., & Wayson, J.^u (2019). Secondary science teachers' reported practices and beliefs on teaching and learning from a large national sample. *Journal of Science Teacher Education*, 80(8), 815-837. DOI: 10.1080/1046560X.2019.1604055
- Boesdorfer, S. B. (2019). Providing Clinical Experience for Preservice Chemistry Teachers through a Homeschool Association Collaboration. *Innovations in Science Teacher Education*, 4(2). <https://innovations.theaste.org/providing-clinical-experience-for-preservice-chemistry-teachers-through-a-homeschool-association-collaboration/>

- Boesdorfer, S.B., Baldwin, E.^u, & Lieberum, K. A.^u (2018). Emphasizing learning: Using standards-based grading in a large non-majors' general chemistry survey course. *Journal of Chemical Education*, 95(8), 1291-1300. DOI: 10.1021/acs.jchemed.8b00251
- Boesdorfer, S. B. (2018). Engaging prospective teachers in learning undergraduate chemistry concepts while using scientific and engineering practices. In J. Rhoton, ed., *Preparing Teachers for Three-Dimensional Instruction* (pp. 125-133). NSTA Press: Arlington, VA.
- Boesdorfer, S.B., & Livermore, R.A.^u (2018). Expense of chemistry experiments: a small barrier to frequent use of laboratory activities in high school chemistry classes. *Chemistry Education Research and Practice*, 19, 135-148. DOI: 10.1039/C7RP00159B
- Boesdorfer, S.B. (2017). Is engineering inspiring change in secondary chemistry teachers' practices? *Journal of Science Teacher Education*, 28(7), 609-630. DOI: 10.1080/1046560X.2017.1389224
- Boesdorfer, S.B. (2017). CET Research Brief: High School Chemistry Teachers' Views of Engineering and Engineering Inclusion Before and After a Professional Development Program. https://cet.uni.edu/sites/default/files/boesdorfer_brief_0.pdf
- Boesdorfer, S.B., & Asprey, L.M.^u (2017). Exploratory study of the teaching practices of novice science teachers who participated in undergraduate science education research. *Electronic Journal of Science Education*, 21(3), 21-45.
- Boesdorfer, S. B. & Staude, K.D.^u (2016). Teachers' practices in high school chemistry just prior to the adoption of the Next Generation Science Standards. *School Science and Mathematics*, 116, 442-458. DOI:10.1111/ssm.12199
- Boesdorfer, S.B. (2016). Review of Teaching and Learning STEM: A Practical Guide. *Journal of Chemical Education*. DOI: 10.1021/acs.jchemed.6b00454
- Boesdorfer, S.B. (2015). Review of Chemistry Education: Best practices, opportunities and trends. *Journal of Chemical Education*: DOI: 10.1021/acs.jchemed.5b00767
- Boesdorfer, S.B. (2015). Chemistry teachers' choice of representations as a tool for understanding their orientation toward science teaching. *Electronic Journal of Science Education*, 19(1), 1-20.
- Boesdorfer, S.B., & Greenhalgh, S. (2014). Make room for engineering: Strategies to overcome anxieties about adding engineering to your curriculum. *The Science Teacher*, 81(9), 51-55.
- Boesdorfer, S.B., & Lorsbach, A. (2014). PCK in action: Examining one chemistry teacher's practice through the lens of her orientation toward science teaching. *International Journal of Science Education*. DOI:10.1080/09500693.2014.909959
- Boesdorfer, S.B. (2014). Review of investigating classroom myths through research on teaching and learning. *Journal of Chemical Education*, 91(4), 470-471.
- Bergman, J.M., Boesdorfer, S., Carver, J.S., Mumba, F., Hunter, W.J.F. (2013) Teaching atomic theory using photoelectron spectroscopy data. *The Chemical Educator*, 13, 1-5
- Boesdorfer, S.B. (2013). Review of making scientists: Six principals to effective science teaching. *Journal of Chemical Education*, 90(9), 1111-12.
- Boesdorfer, S.B. (2013). Review of Teaching Chemistry-A Studybook: A Practical Guide and Textbook for Student Teachers, Teacher Trainees and Teachers. *Journal of Chemical Education*, 90(5), 532-33.
- Boesdorfer, S.B., Lorsbach, A. & Morey, M. (2011). Using a vicarious learning event to create a conceptual change in preservice teachers' understandings of the seasons. *The Electronic Journal of Science Education*, 15(1), 1-14.

Goff, P., *Boesdorfer, S.*, & Hunter, W. (2012). Using a multicultural approach to teach chemistry and the nature of science to undergraduate non-majors. *Cultural Studies of Science Education*, 7, 631-651. Doi 10.1007/s11422-012-9382-6

Bergman, J., *Boesdorfer, S.*, Carver, J., Mumba, F. & Hunter, W. (2010). Student learning on atomic theory using the PES method. *The Chemical Educator*, 15, 370-375. doi 10.1333/s00897102308a

Presentations and Workshops ^u = Undergraduate Student, ^g= Graduate Student

Darner, R., *Boesdorfer, S.B.*, & Antink-Meyer, A. (2021, June). Teachers Engineering Science Learning for All (TESLA). Workshop presented for secondary science educators Noyce Conference.

Boesdorfer, S.B. (2021, March). 3D Assessment Workshop for ISA Writers. Workshop presented as part of the Illinois Science Assessment Writers Grant.

Boesdorfer, S.B. (2021, February 17). Supporting Student Success in Chemistry by Using a Non-Traditional, No Points, Grading System. [Invited Presentation]. Heartland ACS Regional Meeting, Virtual.

Boesdorfer, S.B., Antink-Meyer, A., & Darner, R. (2021, January 14-15). *Exploring How Teachers Engineer Equitable Science Learning: A Theoretical Framework Under Development* [Poster Presentation]. ASTE International Conference 2021, Virtual.

Boesdorfer, S.B. (2020). A 'Levels of Engineering Design' Rubric for Science Teachers Incorporating NGSS. National Association for Research in Science Teaching (NARST) 93rd Annual International Conference, Portland, OR, United States <https://narst.org/sites/default/files/2020-04/NARST%202020%20Conference%20Program%20Book%20with%20URLs.pdf>

Madden, Luke ^u & *Boesdorfer, S. B.* (2020, November 14) Examination of Unprompted Shared Resources and Motives by Chemistry Educators during Online Discussions in Graduate Courses. [Poster Presentation] 5th Annual East Central IL ACS Undergraduate Research Conference, Champaign, IL.

Boesdorfer, S.B. (2019). Integrating Engineering Activities, Ideas, and Tips. Workshop presented at ChemEd 2019, Naperville, IL.

Boesdorfer, S. B., Arias A.M., Mull, B.^u, & Lieberum, K.^u (2019). The Availability and Quality of Existing Curriculum Materials to Support Chemistry Teaching to Facilitate NGSS-Aligned Engineering Instruction. Paper presented at ASTE International Conference 2019, Savannah, GA.

Lieberum, K.^u & *Boesdorfer, S. B.* (2018). Reinforcement of daily learning objectives: The importance of connecting the end of a lesson with your objective. Poster presentation at 3rd Annual East Central Illinois Local ACS Section Undergraduate Research Conference, Champaign, IL.

Boesdorfer, S. B., & Frederking, D.^g (2018). Online chemistry teacher development: Assessing the impact of an online program on chemistry teachers' development. Presented at 25th Biennial Conference on Chemical Education, South Bend, IN.

Boesdorfer, S. B. (2018). Homeschooled chemistry: Collaboration between a university chemistry department and a homeschooling cooperative. Presented at 25th Biennial Conference on Chemical Education, South Bend, IN.

Lieberum, K.^u, Mull, B.^u, *Boesdorfer, S.B.*, & Arias, A. (2018). Availability of quality engineering resources and lessons for a high school chemistry classroom. Poster presentation at Illinois State University Research Symposium, Normal, IL.

- Aiello, N.,^u Jang, Y. J.,^u *Boesdorfer, S.B.*, & Green, I. (2018) How physical chemistry students use metacognition to be successful in class. Poster presentation at Illinois State University Research Symposium, Normal, IL.
- Boesdorfer, S.B.* (2018). Homeschooling collaboration as clinical experience: a comparison of inservice teachers' reflections on their pre-service clinical experiences. Paper presented at ASTE International Conference 2018, Baltimore, MD.
- Baldwin, E.K.,^u Lieberum, K.A.,^u & *Boesdorfer, S.B.* (2017). Students' Response to Standards-based Grading in a Non-majors General Chemistry Course. Poster presentation at Illinois State University Research Symposium, Normal, IL.
- Boesdorfer, S.B.* (2017). Could engineering help improving chemistry teachers' use of reform-based practices in their classrooms? Paper presented at ASTE International Conference 2017, Des Moines, IA.
- Boesdorfer, S. B.*, & Cler, S.^g (2016). Standards-based grading in a large general chemistry course. Presented at 24th Biennial Conference on Chemical Education, Greeley, CO.
- Schafer, A.,^g & *Boesdorfer, S.B.* (2016) Effect of feedback on academic achievement and self-regulatory skills of high school chemistry students. Poster presentation at 24th Biennial Conference on Chemical Education, Greeley, CO.
- Boesdorfer, S.B.* & Del Carlo, D. (2016). Crosscutting concepts guiding curricular changes in high school chemistry. Presented at 24th Biennial Conference on Chemical Education, Greeley, CO.
- Del Carlo, D. & *Boesdorfer, S.B.* (2016). Chemistry as the crosscutting concept for secondary science teacher professional development. Presented at the 251st ACS National Meeting, San Diego, CA.
- Wayson, J.,^u *Boesdorfer, S.B.*, Del Carlo, D. (2016). Impact of research experiences on secondary science teachers' teaching beliefs and practices. Paper presented at ASTE International Conference 2016, Reno, NV.
- Boesdorfer, S.B.* (2015). How some high school chemistry teachers are incorporating engineering in their classes. Paper presented at ChemEd 2015 Conference, Kennesaw, GA
- Boesdorfer, S.B.* (2015). Engineering activities for high school chemistry. Workshop presented at ChemEd 2015 Conference, Kennesaw, GA.
- Boesdorfer, S.B.* (2015) Teaching engineering design to in-service teachers. Presented at ASTE International Conference 2015: Exploring New Frontiers, Portland, OR.
- Boesdorfer, S.* (2014). Engineering practices in chemistry: It can be about processes. Workshop presentation at the Iowa Science Teaching Section of the Iowa Academy of Science's Fall Conference, Ames, IA.
- Boesdorfer, S.* & Staude, K.^u (2014). Iowa chemistry teachers' perceptions of NGSS and their professional development needs in light of looming adoption of NGSS. Paper presented at the 2014 Biennial Conference on Chemical Education, Allendale, MI.
- Boesdorfer, S.* (2014). Engineering as an E in the learning cycle to meet NGSS content and engineering standards. Paper presented at the 2014 Biennial Conference on Chemical Education, Allendale, MI.
- Boesdorfer, S.* (2014). Engineering: An E in the science learning cycle. Workshop presentation at the UNI Science Education Update Conference, April 4, 2014. Cedar Falls, IA.

- Boesdorfer, S.B., & Asprey, L.^u (2014).* Effects of undergraduate science education research on teachers' practices. Paper presented at the 21st International Conference of Association for Science Teacher Education, San Antonio, TX.
- Boesdorfer, S. (2013).* Science and engineering: Including both in the science classroom through activities. Workshop presentation at the Iowa Science Teaching Section of the Iowa Academy of Science's Fall Conference, Ames, IA.
- Asprey, L.^u & Boesdorfer, S.B. (2013).* Effects of undergraduate science education research on teachers' practices. Poster presented at the Annual North-Central Regional meeting of the Association for Science Teacher Education, Moline, IL.
- Boesdorfer, S. (2013).* High school chemistry teachers' use of different representations while teaching the periodic table. Poster presented at 2013 Physics Teacher Education Coalition Conference, Baltimore, MD.
- Boesdorfer, S., & Hunter, W. (2012).* *Affecting high school chemistry teachers' practice through an online graduate-level course concerning best practices.* Paper presented at the Biennial Conference on Chemical Education, College Station, PA.
- Boesdorfer, S. (2010).* Assessment in science through chemistry activities. Workshop presentation at the IICC Conference on Assessment in Mathematics and Science. August 2010.
- Boesdorfer, S., Lorsbach, A. & Morey, M. (2009).* Using a vicarious learning event to create a conceptual change in preservice teachers' understandings of the seasons. Poster presented at Seventh Focus on Illinois Education Research Symposium, Champaign, IL.

Grants/Awards Received

- Co-PI. Illinois Science Assessment Item Development – Central Illinois Cohort with R. Darner. July 1, 2020- June 30, 2022. Subcontract from Southern Illinois University, Illinois State Board of Education (ISBE) Grant. \$290,000.
- Co-PI. *Integrating Crosscutting Concepts in Iowa Science Classrooms (ICCISC)* with L. Escalada. Iowa Department of Education, Title II-B Mathematics and Science Partnership Program. \$512,805. Granted.
- Engineering Activities for Teaching Chemistry. \$29,000 Part of Research Fellow: Center of Educational Transformation (CET) Fellowship, University of Northern Iowa. Awarded December 4, 2013. Fellowship Dates: Spring/Summer 2014 and 2014-15 Academic Year.

Previous Teaching Certifications

- National Board Certified Teacher - Science/Adolescence and Young Adults. – Expired 2018
- State of Illinois - State Teacher Certification Board, type: secondary teaching, grade 6-12. Certified for Chemistry, Physics, and Physical Science -Expired 2018.

Service to Profession

- Co-editor of *Innovations in Science Teacher Education*, ASTE Journal
- American Chemical Society, Division of Chemistry Education -Precollege Committee Member
- Editorial Review Board Member, *Journal of Science Teacher Education (JSTE)*
- Reviewer for *Journal of Chemical Education*, *Chemical Educator*, *Chemistry Education Research and Practice*, *Journal of Teacher Education*, *Journal of STEM Teacher Education*, *Teacher Educator*

Service to University

Director of Chemistry Education, Department of Chemistry (Fall 2015- Present)

Secondary and K12 Teacher Education Program Liaison

Chemistry Departmental Committees

Council for Teacher Education, College of Arts and Sciences Representative (Fall 2018-Spring 2019, Fall 2020-Present)

University Teacher Education Assessment Committee (UTEAC) (Fall 2019-Spring 2020)

University Hearing Panel (Fall 2016-Spring 2018)

Learning Community Leader, CTLT (Spring 2019-Present).

Faculty Fellow, CTLT (Summer 2019 and 2020)

Teaching Mentor, CTLT (Summer 2020)

Academic Continuity Committee, Professional Development Advisory Group (Summer 2020-Spring 2021)

Teaching Scholar in Residence CTLT (May 17, 2021- Present)

Professional and Academic Associations/Memberships

American Chemical Society (ACS)

American Association of Chemistry Teachers (AACT)

Association for Science Teacher Education (ASTE)

Illinois Science Teachers Association (ISTA)

National Science Teachers Association (NSTA)