BARBARA FAGUNDES, Ph.D.

Postdoctoral Researcher | AI and Computing Education | Engineering Education Research | STEM Learning and Faculty Development

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PROFESSIONAL SUMMARY

Postdoctoral researcher in Engineering Education with interdisciplinary expertise in computer science, early childhood education, STEM learning, faculty development, and instructional innovation. My work focuses on strengthening the computing education pipeline by advancing research on early computational thinking, undergraduate STEM engagement and persistence, and responsible integration of generative AI in computing and engineering education. I use qualitative and mixed methods approaches, including interviews, focus groups, classroom video analysis, thematic analysis, and survey design, to study how instructional environments and emerging technologies shape learning. Across K-12, undergraduate, and faculty development contexts, I translate research findings into evidence-based instructional guidance, curriculum resources, and research-to-practice initiatives that support computing education, AI literacy, STEM persistence, and workforce readiness.

RESEARCH AGENDA

My research agenda focuses on strengthening computing education across the K-16 pipeline through three interconnected areas: early computational thinking, undergraduate STEM engagement and persistence, and responsible AI integration in computing education. This agenda builds on my doctoral research on early computational thinking, NSF-funded K-12 STEM education projects, postdoctoral work on undergraduate STEM learning and faculty development, and current research on generative AI use in computer science and engineering courses.

RESEARCH AREAS AND METHODS

Research Areas

- AI in education and emerging technologies for learning
- Computing education and computational thinking across K-16
- Undergraduate STEM engagement, autonomy, and persistence
- Engineering education research and STEM learning
- Faculty development, student-faculty partnerships, and evidence-based teaching
- Curriculum design, assessment, evaluation, and instructional improvement

Methods and Tools

- Qualitative research, thematic analysis, interviews, focus groups
- Classroom video data collection and analysis
- Survey design and mixed-methods analysis
- Human subjects research and school-based data logistics
- NVivo, Qualtrics, MS Office, LMS tools, Camtasia, Adobe Premiere Pro
- MATLAB, Python, SQL, JavaScript, Java, C++

SELECTED RESEARCH AND PROFESSIONAL IMPACT

- Ph.D. in Engineering Education, M.S. in Computer Science, and B.A. in Early Childhood Education, supporting interdisciplinary expertise across computing, developmental learning, and STEM education.
- Postdoctoral researcher at Purdue University's Center for Instructional Excellence, contributing to research on generative AI use, undergraduate STEM engagement, faculty development, and student-faculty partnerships.
- Led qualitative research activities for a large-scale AI-Lab study in undergraduate computer science and engineering courses, including focus groups, thematic analysis, and interpretation of students' responsible AI use.
- Developed and disseminated research on early computational thinking, educational robotics, sequencing, debugging, and engagement in K-2 learning environments.
- Contributed to NSF-funded STEM education initiatives involving curriculum development, teacher-facing materials, classroom data collection, and research-to-practice dissemination.
- Active scholarly pipeline includes manuscripts on generative AI in computing education, autonomy-supportive STEM classrooms, and early computational thinking.

EDUCATION

Purdue University **Winter 2024**
Ph.D., Engineering Education | Advisor: Dr. Tamara J. Moore
West Lafayette, IN

Jackson State University **Spring 2017**
M.S., Computer Science
Jackson, MS

Universidade Sant'Anna **Summer 2010**
B.A., Early Childhood Education | Minors: K-5 education, policy, and school administration
São Paulo, Brazil

RESEARCH EXPERIENCE

Postdoctoral Researcher **Fall 2024 - Present**
Center for Instructional Excellence (CIE), Purdue University
West Lafayette, IN

- Lead qualitative research on undergraduate students' use of generative AI in computer science and engineering courses, with attention to learning processes, ethical use, tool limitations, and instructional implications.
- Design and facilitate focus groups and interviews; conduct thematic analysis to identify how students describe their engagement with emerging AI tools in technical coursework.
- Contribute to manuscripts and presentations that generate evidence-based guidance for responsible AI integration in computing and engineering education.
- Co-lead the Student Pedagogy Advocates program, facilitating student-faculty partnerships and mentoring undergraduate partners in research-practice initiatives.
- Lead development of a first-author manuscript on autonomy-supportive instructional practices in higher education STEM classrooms.
- Collaborate with faculty and institutional teaching initiatives to support evidence-based instructional practices, faculty development, and improved STEM learning environments.

Graduate Research Assistant **Spring 2022 - Fall 2023**
NSF RECT Project: Rethinking Circle Time - Integrating Computational Thinking into K-2 Literacy, Purdue University
West Lafayette, IN

- Developed programming lessons integrating computational thinking into K-2 literacy curriculum.
- Conducted classroom-based video data collection and qualitative analysis in K-2 classroom settings.
- Created instructional video tutorials, including scripting, filming, and editing, to support curriculum implementation.
- Designed and administered Qualtrics surveys to assess teachers' computational thinking implementation.
- Performed literature reviews in K-12 STEM, early childhood education, and computational thinking education.
- Co-authored peer-reviewed journal and conference papers and mentored junior Ph.D. students in collaborative research activities.

Graduate Research Assistant **Fall 2018 - Fall 2019**
Epistemic Research Laboratory, Purdue University
West Lafayette, IN

- Coordinated classroom-based video data collection in K-12 engineering settings.
- Managed research logistics to support timely, compliant, and high-quality data collection across school contexts.
- Supported implementation of engineering design curriculum in K-12 classrooms.
- Co-authored a peer-reviewed conference paper on engineering design decision processes, supporting research on student learning in design-based STEM environments.

Data Research Manager **Fall 2017 - Fall 2018**
Research Institute for Pre-College Engineering (INSPIRE), Purdue University
West Lafayette, IN

- Managed classroom-based video data collection across Indiana schools for a large-scale pre-college engineering education research project.
- Coordinated research logistics with schools, teachers, faculty, and graduate researchers to support timely and compliant data collection.
- Organized and managed classroom instruction data for grades 6-8 engineering curriculum implementation.
- Supported K-12 STEM education research focused on student learning, engineering design, and curriculum implementation.

TEACHING, CURRICULUM DEVELOPMENT, AND FACULTY SUPPORT EXPERIENCE

Teaching Assistant, E-Learning Development (Graduate Course) **Spring 2024 - Summer 2024**
School of Engineering Education, Purdue University
West Lafayette, IN

- Co-developed the graduate course Teaching Engineering Online, creating module content, scripts, and instructional slides for future course delivery.
- Applied instructional design principles to structure modules and align learning outcomes, activities, and course materials.
- Designed accessible and interactive course materials to support online and blended teaching.
- Collaborated with faculty collaborators to integrate evidence-based teaching practices.

Research Assistant, Instructional Design **Summer 2021**
CISTAR NSF Engineering Research Center, PurdueUniversity
West Lafayette, IN

- Designed e-learning training modules and video-based instructional supports for middle school teachers within NSF-funded engineering initiatives.
- Collaborated with faculty and project partners to align instructional materials with learner needs and curriculum objectives.
- Authored video scripts and produced instructional lessons and tutorials using Camtasia and Adobe Premiere Pro.
- Translated engineering concepts into accessible teacher-facing learning materials.

Research Assistant, Curriculum Development **Summer 2020**
CISTAR NSF Engineering Research Center, Purdue University
West Lafayette, IN

- Collaborated with interdisciplinary research team members to develop a middle school chemical engineering curriculum.
- Identified student learning needs through communication with faculty and iterative feedback cycles.
- Established instructional goals and aligned activities with engineering learning objectives.
- Participated in weekly progress meetings to refine curriculum design and implementation.

Teaching Assistant, First-Year Engineering Courses **Fall 2019 - Fall 2021**
School of Engineering Education, Purdue University
West Lafayette, IN

- Supported instruction in two required First-Year Engineering courses serving approximately 240 students per semester.
- Mentored student teams through semester-long engineering design projects involving problem scoping, stakeholder analysis, criteria and constraints, evidence-based decisions, and iterative design refinement.
- Supported students in using Excel and MATLAB to evaluate design decisions and communicate technical reasoning.
- Provided feedback on technical reports, visual communication, and oral presentations; led select class sessions as guest instructor.
- Coordinated undergraduate TAs and graders, aligning grading practices, rubrics, and feedback processes.

Tutor of Computer Science Subjects **Fall 2015 - Spring 2016**
Jackson State University
Jackson, MS

- Provided academic support to undergraduate students in Digital Logic, Physics, and Computer Science courses.
- Assisted students with programming assignments, lab activities, and troubleshooting logic-based problems.

Pre-Kindergarten and Elementary School Teacher **Fall 2008 - Summer 2013**
Private and public schools
São Paulo, Brazil

- Designed and delivered interdisciplinary lessons in literacy, mathematics, science, geography, and history.
- Implemented project-based learning activities to support early problem-solving and collaboration skills.
- Differentiated instruction for students with diverse learning needs and backgrounds.
- Conducted monthly progress assessments and prepared detailed reports for families and school administration.

PEER-REVIEWED JOURNAL ARTICLES

Tank, K. M., Ottenbreit-Leftwich, A., Moore, T. J., Yang, S., Wafula, Z., Kim, J., **Fagundes, B**., & Chu, L. (2024). Investigating Sequencing as a Means to Computational Thinking in Young Children. *International Journal of Computer Science Education in Schools*, *6*(3), 67–77. https://doi.org/10.21585/ijcses.v6i3.192

PEER-REVIEWED CONFERENCE PROCEEDINGS / CONFERENCE PUBLICATIONS

Fagundes, B., & Moore, T. J. (2025, June). Comparing computational thinking learning and engagement in first-grade boys and girls: A study of algorithm design and debugging (WIP). In *Proceedings of the ASEE Annual Conference & Exposition*. American Society for Engineering Education.

Fagundes, B., Guberman, D., Smart, K., & Holder, K. (2025, June). Student pedagogy advocates: Enhancing teaching and learning through student-faculty partnerships (WIP). In *Proceedings of the ASEE Annual Conference & Exposition*. American Society for Engineering Education. https://doi.org/10.18260/1-2--55986

Wafula, Z., Tank, K. M., Moore, T. J., Ottenbreit-Leftwich, A. T., **Fagundes, B.**, & Kim, J. (2024). Assessing computational thinking skills in early elementary students: A focus on sequencing tasks. In J. Cohen & G. Solano (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 400–405). Association for the Advancement of Computing in Education. https://www.learntechlib.org/primary/p/223964/

Fagundes, B., Bhide, N., Moore, T. J., & Tank, K. M. (2021, July). Computational thinking in first-grade students using a computational device (WIP). In *Proceedings of the ASEE Annual Conference & Exposition*. American Society for Engineering Education. https://doi.org/10.18260/1-2--36825

Fagundes, B., Ehsan, H., Moore, T. J., Tank, K. M., & Cardella, M. E. (2020, June). First-graders' computational thinking in informal learning settings (WIP). In *Proceedings of the ASEE Annual Conference & Exposition*. American Society for Engineering Education. https://doi.org/10.18260/1-2--35541

Johnston, A. C., Lopez-Parra, R. D., Tank, K. M., Moore, T. J., & **Fagundes, B.** (2019, June). Design decision processes of first-grade students during an engineering design-based STEM unit. In *Proceedings of the ASEE Annual Conference & Exposition*. American Society for Engineering Education. https://doi.org/10.18260/1-2--32599

Yeter, I. H., Rynearson, A. M., Ehsan, H., Rehmat, A. P., Dasgupta, A., **Fagundes, B.**, Menekse, M., & Cardella, M. E. (2019, June). Design and implementation of data collection in a large-scale, multi-year pre-college engineering study: A retrospective. In *Proceedings of the ASEE Annual Conference & Exposition*. American Society for Engineering Education. https://doi.org/10.18260/1-2--32596

PREPRINTS AND MANUSCRIPTS SUBMITTED

Dickey, E., Bejarano, A., Kuperus, R., & **Fagundes, B.** (2025). *Evaluating the AI-Lab intervention: Impact on student perception and use of generative AI in early undergraduate computer science courses*. arXiv. https://doi.org/10.48550/arXiv.2505.00100

MANUSCRIPTS IN PREPARATION

Fagundes, B., Harris-Thomas, B., Bonem, E., Guberman, D., & Levesque-Bristol, C. (2026). *Supporting student autonomy in higher education STEM classrooms: Faculty practices, barriers, and evolving perceptions* [Manuscript in preparation]. Target journal: *International Journal of STEM Education*.

PRESENTATIONS, WORKSHOPS, AND POSTERS

Tank, K. M., Ottenbreit-Leftwich, A., Moore, T. J., Yang, S., Wafula, Z., Kim, J., **Fagundes, B.,** & Chu, L. (2024). Investigating Sequencing as a Means to Computational Thinking in Young Children. *International Journal of Computer Science Education in Schools*, *6*(3), 67–77. https://doi.org/10.21585/ijcses.v6i3.192

Moore, T., Tank, K., & **Fagundes, B.** (2023). *Task Interviews as a Research Tool: Cases from K–2 Computational Thinking.* Workshop presented at the Pre-College Engineering Education Division (PCEE) at the 2023 ASEE Annual Conference & Exposition, Baltimore, MD.

Ottenbreit-Leftwich, A., Moore, T. J., Tank, K. M., Kim, J., **Fagundes, B.,** Chu, L., & Wafula, Z. (2023). *Rethinking Circle Time: Development of K-2 CT Literacy Integrated Curriculum* [Poster presentation]. SIGCSE 2023: 54th ACM Technical Symposium on Computer Science Education, Toronto, Ontario, Canada. https://doi.org/10.1145/3545947.3576338. (pp. 1394-1394).

Fagundes, B., Bhide, N., Moore, T. J., Drummond Oaks, M., & Godwin, A. (2022, June). *Online professional development aid for teaching an engineering design-based curriculum in 8th grade (Resource Exchange)*. Work showcased at the Exhibit Hall in 2022 ASEE Annual Conference & Exposition, Minneapolis, MN.

Lopez-Parra, R. D., **Fagundes, B.,** Wallace, D., Bhide, N., Moore, T. J., Drummond Oaks, M., & Godwin, A. (2022, June). *Engineering design-based curriculum for teaching 8th grade students renewable energy (Resource Exchange)*. Work showcased at the Exhibit Hall in 2022 ASEE Annual Conference & Exposition, Minneapolis, MN.

Fagundes, B., & Bhide, N. (2021, July). *Computational Thinking in First-Grade Students Using a Computational Device.* Virtual Poster presentation at 2021 ASEE Annual Conference & Exposition. Online.

Fagundes, B., & Cardella, M. (2018, December). *Exploring Engineering Behaviors of Young Children Interacting with a Parent.* ENE Explorer Poster Session Presentation at Engineering Education Researcher Seminar. Purdue University in West Lafayette, IN.

HONORS AND AWARDS

- Outstanding Service Scholarship Award, Purdue University College of Engineering, 2024 - Recognized by the College of Engineering for outstanding service and contributions to the Purdue community.
- Purdue Society of Women Engineers (SWE) - WE22 National Conference, 2022 - Selected and sponsored by Purdue SWE to represent the university at the Women in Engineering National Conference.
- Grace Hopper Celebration (GHC) Student Scholar, Orlando, FL, 2019 - Selected as a GHC Scholar to attend the world's largest conference for women in computing.
- Diversity Scholarship, Jackson State University, 2016 - Awarded a merit-based scholarship supporting international students from underrepresented backgrounds.
- Presidential Scholarship for Minority Students (PROUNI - University for All Program), Universidade Sant'Anna, São Paulo, Brazil, 2007 - Awarded a full-tuition federal scholarship for undergraduate studies through Brazil's national higher education inclusion program.

ACADEMIC AND PROFESSIONAL SERVICE

- Reviewer, Journal of Pre-College Engineering Education Research (J-PEER), Fall 2025-Present.
- Reviewer, American Society for Engineering Education (ASEE), Fall 2018-Present. Evaluate conference submissions for rigor, clarity, and contribution to engineering education research.
- Brazilian Student Association (BRASA Global) - Student Brand Ambassador, Summer 2022-Summer 2023. Delivered virtual presentations at Brazilian universities to promote international scholarships, mentorship programs, and educational opportunities for low-income students.
- Women in Engineering Program (WIEP) - Pre-College Engineering Outreach Team Member, Purdue University, Summer 2022-Summer 2023. Mentored pre-college girls in engineering through on- and off-campus activities.

- Purdue Graduate Student Government (PGSG) - Senior Senator, Fall 2022-Spring 2023. Represented the Engineering Education Graduate Student Association in shared governance discussions affecting graduate and professional students.
- Grant Review and Allocation Committee (GRAC) - Reviewer, PGSG, Fall 2022. Reviewed applications for professional development and community-based grants.
- Engineering Education Graduate Student Association (ENEGSA) - Member, ESL & Multicultural Committee, Purdue University, 2020. Co-created and hosted "We, the Aliens" podcast on international student experiences in U.S. higher education.
- Summer Undergraduate Research Fellowship (SURF) e-Symposium - Judge, 2020. Evaluated undergraduate research poster presentations during the first fully virtual SURF Symposium.
- School of Engineering Education (ENE), Purdue University - Academic Mentor, 2020. Mentored Ph.D. students on research design, coursework, and teaching practices during the COVID-19 transition to online learning.

PROFESSIONAL MEMBERSHIPS

- American Society for Engineering Education (ASEE)
- Society of Women Engineers (SWE)

LANGUAGES AND SOFTWARE

Languages: Portuguese (Native), English (Fluent), Spanish (Basic)
Research and Data Tools: NVivo, Qualtrics, classroom video data, survey design, qualitative and mixed-methods analysis
Technical and Programming Tools: MATLAB, Python, SQL, JavaScript, Java, C++, PHP
Digital and Web Tools: HTML, CSS, WordPress, MS Office, LMS tools, Camtasia, Articulate 360, Adobe Premiere Pro, Adobe InDesign