Joel Walsh

Curriculum Vitae

✉ joelawalsh@gmail.com
joelawalsh01.github.io

Research Interests

Educational Technology, Natural Language Processing, Knowledge Representation, Teacher Education, Probabilistic Programming, Multimodal Models, Computer Science Education.

Education

2016–2022 **Ph.D. in Curriculum and Instruction – STEM Education**, *University of Texas at Austin*.
Advisor: Dr. Catherine Riegle-Crumb
Dissertation Title: "Natural Language Processing in Educational Contexts: Opportunities and Potential Pitfalls"

2019–2022 **M.S. in Computational Science, Engineering, and Mathematics**, *University of Texas at Austin*.
Advisor: Dr. Moriba Jah
Report Title: "Using Relation Extraction to Identify Launch States of Anthropogenic Space Objects"

2012 **M.Ed. and Preliminary Credential – Secondary Mathematics**, *University of California, Los Angeles*.

2008 **B.A. in Political Science**, *University of California, Davis*.

Publications

2023 Foster, C., Hamer, J., **Walsh, J.**, Converse, G., and Souza, C. *Injecting Knowledge Graph Triples into Large Language Models for Passage and Question Generation*. [Whitepaper]. Finetune Learning. Link

2022 Starbird, M., Wolesensky, W., **Walsh, J.**, Miller, B., and Chahin, T. *The Effective Thinking Calculus Project*. MAA Notes Volume on Diverse, Equitable, and Inclusive Issues in Calculus Programs. arXiv

2022 **Walsh, J.**, Fenech, M., Tucker, D., Riegle-Crumb, C., and La Cour, B. *Piloting a Full-year, Optics-based High School Course on Quantum Computing*. Physics Education. arXiv

Work in Progress

Kim, G. M., **Walsh, J. A.** *Automated Speech Recognition and Multilingualism in Qualitative Research*.

Khan, S., **Walsh, J.**, Nye, B. *Scenario-Based Map Generation using Diffusion Models*. (2024).

Mamidanna, S., **Walsh, J.**, and Nye, B. *Response Grading: Finetuned vs. No or Few-Shot Large Language Models*. (2024).

Presentations and Conferences

Selected Coursework

Statistical Methods I and II, Machine Learning, Statistical Learning, Probability, Mathematical Statistics, Regression Analysis, Social Network Analysis, Bayesian Statistical Methods, Scientific Computing I and II, Computational Linguistics, Natural Language Processing, Design and Analysis of Experiments.

Grants and Fellowships

2023–2026 **Grant Consultant** – Translating Machine Translation for Language Education to Promote Language Learning, Critical Digital Literacies, and Global Citizenship. USDOE International Research and Studies ($150,000).

2021–2022 **Graduate Student Continuing Fellowship**. University of Texas at Austin.

2016–2018 **Graduate Student Recruitment Fellowship**. University of Texas at Austin.

Relevant Work Experience

Apr 2024–Present **Postdoctoral Fellow – AI Learning Technologies**, *University of Southern California – Institute for Creative Technologies*.
Supervising and collaborating on generative vision and text projects with undergraduate students. Building software for numerous learning technologies projects for the military, K-16, and adult education contexts. Conducting research on applications of probabilistic programming to learning technologies.

Sep 2022–Present **Senior Machine Learning Engineer**, *Privateer Space*.
Building and tracking edge-based computer vision models for satellites, developing multimodal systems for semantic search of images, constructing production cloud (AWS) machine learning pipelines, and guiding research and implementation directions.

May 2022–Aug 2022 **AI Research Intern**, *Finetune Learning*.
Worked on NLP-based assessment tools that utilize structured knowledge and Large Language Models (LLMs).

Aug 2024–Present **Instructor**, *California Institute of Technology – Center for Technology and Management Education*.
Developing and implementing seminars on computer vision and multimodal models for cohorts of corporate scientists.

May 2021–Present **Consultant – Data Science Curriculum Developer**, *MathAction*.
Responsible for proposal generation and design as part of a Lucas Foundation Project-Based Learning Design Sprint.

Jan 2020–Jun 2020 **Instructor – Mathematics 175T Computer Science Pathways**, *University of Texas at Austin*.
Part of a Computer Science "micro-credential" for undergraduate math and science majors. Focused on pedagogical content knowledge, multiple representations, computational thinking, and project-based learning.

2019–Present **Graduate Research Assistant**, *Texas Advanced Computing Center – Applied Research Laboratories*.
Creating Quantum Computing curriculum for high school students in the Canvas Learning Management System, including Python and mathematics tutorials via Jupyter notebooks.

2017–Present **Teaching Assistant**, *UTeach Program, University of Texas at Austin*.
Assisting student teachers with lesson planning, data management, and classroom teaching.

2014–2016 **Blended Learning Mathematics Instructor**, *USC Hybrid High School, Los Angeles, CA*.
Digital curriculum creation and implementation.

2011–2014 **Mathematics Instructor**, *Locke High School, Los Angeles, CA*.
Taught Algebra 2, Precalculus, Trigonometry, and Integrated Mathematics.

Service and Campus Organizations

2024 **Panelist**, National Science Foundation.

2021 **Reviewer**, *Computer Science Education*.

2018–Present **Founder**, LAMDA@edu: Student group focused on Learning Analytics, Machine Learning/Data Mining, and Artificial Intelligence.

2020 **Expert Declaration (Volunteer)**, Rio Grande Legal Aid. Provided expert declaration predicting the spread of COVID-19 in federal detention centers for asylum seekers using time series data.

2019–2020 **Vaccine Cold Chain Analysis (Volunteer)**, S and S Project Management (Myanmar). Conducted hierarchical modeling and data analysis on vaccine cold chains from Yangon to the Putao region.