Michael Ion

Curriculum Vitae

Postdoctoral Research Fellow
School of Information
University of Michigan
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Research interests: statistical text classification, natural language processing, conversational data analysis, educational data science, simulation-based inference.

Teaching areas: applied statistics, data science, statistical computing, statistical machine learning, text analysis.

Education

2024 Ph.D. Mathematics Education, University of Michigan, Ann Arbor, MI.

Thesis: Beyond the Classroom: Exploring Mathematics Engagement in Online Communities with Natural Language Processing

Advisor: Deborah Ball; *Committee:* David Jurgens, Christopher Quintana, Ying Xu

2015 M.S. Mathematics, California Polytechnic State University, San Luis Obispo, CA.

2013 B.S. Mathematics, California Polytechnic State University, San Luis Obispo, CA.

Academic Appointments

2025–present Lecturer, Statistics Department, California Polytechnic State University, San Luis Obispo, CA.

2024–present Postdoctoral Research Fellow, School of Information, University of Michigan. Ann Arbor, MI.

2016–2017 Lecturer, Mathematics Department, California Polytechnic State University, San Luis Obispo, CA.

Professional Experience

2022–2023 Editorial Assistant, Journal for Research in Mathematics Education (JRME).

2017–2024 Graduate Research Assistant, GRIP Lab, University of Michigan, Ann Arbor, MI.

2020–2022 Research Assistant, College and Beyond II Project (Mellon Grant), University of Michigan, Ann Arbor, MI.

Publications

Submitted

1. Asthana, S., Banovic, N., **Ion, M.**, Collins-Thompson, K. (Under Review). Understanding the Challenges and Opportunities for Responsible AI use in Prerequisite Skill Assessments For Interdisciplinary Graduate Programs. Submitted to *ACM Conference on Human Factors in Computing Systems (CHI) 2026.*
2. **Ion, M.**, Collins-Thompson, K. (Under Review). MathMentorDB: A Massive Dataset of Authentic Online Mathematics Tutoring Dialogues. Submitted to *Language Resources and Evaluation Conference (LREC-COLING) 2026.*

In Preparation

3. **Ion, M.**, Collins-Thompson, K. Measuring What Matters: A Scenario-Driven, Multidimensional Framework for Evaluating LLM Tutors. *Frontiers in Artificial Intelligence* (invited paper).
4. **Ion, M.**, Ball, D.L. Teaching and Learning in the Age of Generative AI: Understanding the Human Work of Instruction. *For the Learning of Mathematics*.

Refereed Journal Articles

5. Herbst, P., Brown, A.M., **Ion, M.**, Margolis, C. (2023). Teaching Geometry for Secondary Teachers: What are the Tensions Instructors Need to Manage? *International Journal of Research in Undergraduate Mathematics Education*. [paper]
6. Gere, A., Godfrey, J., Griffin, M., **Ion, M.**, Limlamai, N., Moos, A., Van Zanen, K. (2023). Alumni Perspectives on General Education: How Writing Can Increase What We Know. *Journal of General Education, 70*(1-2), 149-175. [paper]

Refereed Conference Proceedings

7. **Ion, M.**, Herbst, P., Ko, I., Hetrick, C. (2023). Agreeing on objectives of geometry for teachers' courses: Feedback from instructors on an initial list. *Psychology of Mathematics Education, North America Annual Conference*. Reno, NV.
8. Brown, A., Herbst, P., **Ion, M.** (2023). How Instructors of Undergraduate Mathematics Courses Manage Tensions Related to Teaching Courses for Teachers. *Psychology of Mathematics Education, North America Annual Conference*. Reno, NV.
9. Boyce, S., An, T., Pyzdrowski, L., Oppong-Wadie, K., **Ion, M.**, St. Goar, J. (2023). Learning from Lesson Study in the College Geometry Classroom. *25th Annual Conference on Research in Undergraduate Mathematics Education*. Omaha, NE.
10. Hetrick, C., Herbst, P., **Ion, M.**, Brown, A. (2023). Building Instructional Capacity Across Difference: Analyzing Transdisciplinary Discourse in a Faculty Learning Community focused on Geometry for Teachers Courses. *25th Annual Conference on Research in Undergraduate Mathematics Education*. Omaha, NE.
11. Hetrick, C., Herbst, P.G., Brown, A.M., **Ion, M.** (2023). Contention and Coalescence in Mathematical Knowledge: Undergraduate Geometry Instructors' Cooperative Design of Student Learning Objectives. *American Educational Research Association*. San Diego, CA. [paper]
12. **Ion, M.**, Herbst, P. (2022). Conceptions of the Derivative: A Natural Language Processing Approach. *Research in Undergraduate Mathematics Education Conference*. Boston, MA.
13. Margolis, C., **Ion, M.**, Herbst, P., Milewski, A., Shultz, M. (2020). Understanding instructional capacity for high school geometry as a systemic problem through stakeholder

interviews. *Psychology of Mathematics Education, North America*. Mexico. [paper]

14. Bardelli, E., **Ion, M.**, Ko, I., Herbst, P. (2020). Who Benefits from Mathematics Courses for Teachers? An Analysis of MKT-G Growth During Geometry for Teachers Courses. *American Education Research Association*. San Francisco, CA. [paper]
15. **Ion, M.**, Herbst, P., Margolis, C., Milewski, A., Ko, I. (2019). Developing Practical Measures To Support the Improvement of Geometry for Teachers Courses. *Psychology of Mathematics Education, North America Annual Conference*. St. Louis, MO.
16. Milewski, A., **Ion, M.**, Herbst, P., Shultz, M., Ko, I., Bleecker, H. (2019). Tensions in Teaching Mathematics to Future Teachers: Understanding the Practice of Undergraduate Mathematics Instructors. *American Education Research Association Conference*. Toronto, Canada. [paper]
17. Herbst, P., Milewski, A., **Ion, M.**, Bleecker, H. (2018). What Influences Do Instructors of the Geometry for Teachers Course Need to Contend With? *Psychology of Mathematics Education, North America*. Greenville, SC.

Edited Book Chapters

18. An, T., Boyce, S., Brown, A., Buchbinder, O., Cohen, S., Dumitrascu, D., Escuadro, H., Herbst, P., **Ion, M.**, Krupa, E., Miller, N., Pyzdrowski, L., Sears, R., St. Goar, J., Szydlik, S., Vestal, S. (2024). (Toward) Essential student learning objectives for teaching geometry to pre-service secondary teachers. *The AMTE Handbook of Mathematics Teacher Education: Reflection on Past, Present and Future – Paving the Way for the Future of Mathematics Teacher Education*, 175-197.

Non-Peer-Reviewed Articles

19. **Ion, M.**, Herbst, P. (2021). A Contribution to Stewarding the SLOs: Developing SLO Assessment Items and Examining Item Responses. *GeT: The News!, 3*(1).
20. Herbst, P., **Ion, M.** (2021). A Deeper Dive into an SLO Item: Examining Students' Ways of Reasoning about Relationships between Euclidean and Non-Euclidean Geometries. *GeT: The News!, 3*(1).
21. Boyce, S., **Ion, M.**, Lai, Y., McLeod, K., Pyzdrowski, L., Sears, R., St. Goar, J. (2021). Best-Laid Co-Plans for a Lesson on Creating a Mathematical Definition. *AMS Blogs: On Teaching and Learning Mathematics*.

Presentations (* indicates presenter)

Invited

22. **Ion, M.*** (2025). Text-as-Data in Mathematics Education: Harnessing LLMs to Analyze Student Conversations at Scale. *AMS Special Session on SoTL: Connecting Generative AI and Scholarly Inquiry to Improve Teaching and Learning, Joint Mathematics Meeting (JMM)*. Seattle, WA.
23. **Ion, M.*** (2024). Use of LLMs and Langchain to Extract Insights about Mathematics Conversations at Scale. Guest lecture, *SIADS 676: Applications of Generative AI*, University of Michigan.
24. **Ion, M.*** (2023). New Directions in Education Research: Harnessing Text-as-Data Methods. San Diego State University, CA.

Conferences

25. **Ion, M.***, Light, M., Collins-Thompson, K. (2025). Bayesian Hierarchical Modeling of Large-Scale Math Tutoring Dialogues. *Joint Statistical Meetings*, Nashville, TN, August 2-7, 2025.
26. **Ion, M.*** (2023). New Directions in Education Research: Harnessing Text-as-Data Methods. *Educational Studies Graduate Student Brown Bag Series*, University of Michigan, Ann Arbor, MI.
27. Paulson, A.*, Godfrey, J., **Ion, M.** (2023). Writing Across the Curriculum: a Case Study in Text as Data Methods for Postsecondary Education Policy Research. Denver, CO.
28. Godfrey, J.*, Paulson, A., **Ion, M.** (2023). What Are the Common Contexts for College Writing? *Conference on College Composition and Communication Annual Convention*. Chicago, IL.
29. Paulson, A.*, **Ion, M.**, Godfrey, J. (2022). Writing Across the Curriculum: a Text as Data Approach. *Causal Inference in Education Research Seminar (CIERS)*. Ann Arbor, MI.
30. Paulson, A., Bardelli, E.*, Godfrey, J., **Ion, M.**, Frisby, M. (2022). Who Follows Placement Recommendations? Differential Effects of Non-binding Placement Recommendations on Students' Course-taking Decisions. *American Education Research Association*. San Diego, CA.
31. **Ion, M.***, Margolis, C. (2019). Sources of Justification for College Geometry Instructional Actions. *Graduate Student Community Organization Graduate Student Conference*. Ann Arbor, MI.
32. Milewski, A., Herbst, P.*, **Ion, M.**, Bleecker, H. (2019). What do we know about courses in Geometry for Secondary Teachers? *Joint Mathematics Meetings*. Baltimore, MD.
33. **Ion, M.*** (2018). Characterizing University Geometry Courses: An Interview-Based Approach. *Graduate Student Community Organization Graduate Student Conference*. Ann Arbor, MI.

Posters

34. **Ion, M.***, Asthana, S., Jiao, F., Wang, T., Collins-Thompson, K. (2025). Adaptive Knowledge Assessment in Simulated Coding Interviews. Poster presentation, *iRAISE Workshop at AAAI Conference*. Philadelphia, PA.
35. Boyce, B.*, **Ion, M.** (2023). Geometry Students' Ways of Thinking About Adinkra Symbols. Poster presentation, *Psychology of Mathematics Education, North America Annual Conference*. Reno, NV.
36. Danai, A.*, Quimper Osores, A.*, **Ion, M.**, Herbst, P. (2023). Analysis of Citation Networks of Submitted Manuscripts in Mathematics Education. Poster presentation, *Undergraduate Research Opportunity Program (UROP) Symposium*. Ann Arbor, MI. Blue Ribbon Outstanding Presenter Award.
37. Beckemeyer, R.*, Brown, A., **Ion, M.**, Spiteri, A., Herbst, P. (2022). How Experience and Knowledge Affect the Breaching Patterns of Secondary Mathematics Teachers. Poster presentation, *Undergraduate Research Opportunity Program (UROP) Symposium*. Ann Arbor, MI. Blue Ribbon Outstanding Presenter Award.
38. **Ion, M.*** (2022). Studying Conceptions of the Derivative at Scale: A Machine Learning Approach. Poster presentation, *45th Conference of the International Group for the Psychology of Mathematics Education*. Alicante, Spain.
39. Berzina Pitcher, I.*, **Ion, M.**, An, T., Brown, A., Buchbinder, O., Herbst, P., Hetrick, C., Miller, N., Prasad, P., Pyzdrowski, L., St. Goar, J., Sears, R., Szydlik, S., Oshkosh, Vestal, S. (2022). Learning and Participating in Scholarship of Teaching and Learning through a Faculty Online Learning Community. Poster presentation, *American Education Research Association*. San Diego, CA. [paper]

40. Herbst, P. G.*, Milewski, A. M., **Ion, M.**, Ko, I. (2021). Preparing Teachers for Secondary Geometry: Helping Shape the Geometry Course for Teachers. Poster presentation, *National Council of Teachers of Mathematics*. Virtual.
41. Herbst, P.*, Stevens, I., Milewski, A., **Ion, M.**, Ko, I. (2020). State of Undergraduate Geometry Courses for Secondary Teachers: Curriculum, Instructional Practices, and Student Achievement. Poster presentation, *Joint Mathematics Meeting*. Denver, CO.
42. Milewski, A.*, Herbst, P., **Ion, M.**, Bleecker, H. (2019). Preparing Teachers for Secondary Geometry: Understanding the Tensions in Teaching Undergraduate Mathematics Courses for Future Teachers. Poster presentation, *Association of Mathematics Teacher Educators Annual Conference*. Orlando, FL. [paper]
43. **Ion, M.***, Bardelli, E., Herbst, P. (2018). Learning About the Norms of Teaching Practice: How Can Machine Learning Help Analyze Teachers' Reactions to Scenarios? Poster presentation, *Michigan Institute for Data Science Annual Symposium*. Ann Arbor, MI. Awarded 'Most Likely Scientific Impact'.

Funding

Awards

2025 co-PI, Learning Through Technical Interviews: Combining Data Science Mentorship with AI-Powered Practice. Academic Innovation Fund, University of Michigan. $12,435.

2017–2023 Graduate Research Assistant, GeT Support: An online professional learning community to support the geometry course for teachers. NSF IUSE Grant #1725837. $2.3M. PI: P. Herbst.

Submittals

Senior Personnel & Co-Author, Instructor-centered Holistic Modeling of Student Engagement and Progress in Data Science, submitted to NSF 23-624: Research on Innovative Technologies for Enhanced Learning (RITEL). PI: K. Collins-Thompson. $750,000. *Not funded*.

Senior Personnel and Co-Author, Test Beds for Higher Education, submitted to NSF 24-111: Planning Grants to Create Artificial Intelligence (AI)-Ready Test Beds. PI: K. Collins-Thompson. $100,000. *Not funded*.

Teaching

California Polytechnic State University, Instructor of Record

STAT251 Statistical Inference for Management I	Fall 2025
MATH161 Calculus for Life Sciences	Summer 2017
MATH118 Precalculus	Spring 2017, Winter 2015, Fall 2014
MATH221 Calculus for Business and Economics	Spring 2015, Spring 2014

University of Michigan, Graduate Student Instructor

EDUC793 Introduction to Quantitative Methods	Fall 2019, Fall 2018

Johns Hopkins Center for Talented Youth, Lead Instructor

Paradoxes and Infinities	Summer 2019 (Hong Kong)
	Summer 2018 (Seattle)

Uplimit (formerly CoRise), Teaching Assistant

Fine-tuning Large Language Models	September–October 2023
Prompt Design and Building AI Products	May–June 2023, August–September 2023
Building AI Products with OpenAI	June–July 2023
R for Data Science	April–May 2023
Python for Data Science	May–June 2023

Students

Graduate Research Mentorship, University of Michigan

Megan Pouncy, M.S. Applied Data Science, Research Assistant (2025–present)

Michael Light, M.S. Applied Data Science, Research Assistant (2024–present)

Sumit Asthana, Ph.D. Computer Science and Engineering (2024–2025). Current position: Researcher, Microsoft Research.

Undergraduate Research Opportunity Program (UROP), University of Michigan

Fengquan Jiao, undergraduate (2024–2025)

Tianyi Wang, undergraduate (2024–2025)

Andre Quimper Osores, undergraduate (2022–2023)

Amirali Danai, undergraduate (2022–2023)

Noah Boudrie, undergraduate (2022–2023)

Robert Beckemeyer, undergraduate (2021–2022)

Andrew Spiteri, undergraduate (2021–2022)

Service

2015–2016 Peace Corps Volunteer, Hukuntsi, Botswana.

Reviewer

Journals: Journal for Research in Mathematics Education; Investigations in Mathematics Learning; Journal of Engineering Education.

Conferences: Psychology of Mathematics Education (PME-NA); Research in Undergraduate Mathematics Education (RUME).

Honors and Awards

2023 Candidacy Tuition Fellowship, University of Michigan

2022 Rackham Debt Management Award, University of Michigan. $15,000.

2021 Harold and Vivian Shapiro/John Malik/Jean Forrest Award. $2,000.

2021 Jones-Payne-Coxford Award (One semester funding)

2018 Most Likely Transformative Science Impact Award, Michigan Institute for Data Science

2017–2021 School of Education Scholar Award, University of Michigan (Full funding for four years)

2015 Outstanding Teaching Associate Award, California Polytechnic State University. $500.