

MICHAEL (MIKE) ION

Postdoctoral Research Fellow
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I'm an educator, researcher, and developer working at the intersection of mathematics, statistics, data science, and AI. My work integrates computational methods and statistical modeling with insights from educational research, exploring how teachers and learners strategically interact to build effective learning environments. I am particularly committed to developing innovative tools and strategies that account for learners' diverse backgrounds, support adaptive teaching methods, and promote meaningful feedback and learner agency.

ACADEMIC POSITIONS

2024–Present **Postdoctoral Research Fellow**, School of Information
University of Michigan, Ann Arbor
Research Advisor: [Kevyn Collins-Thompson](#)

EDUCATION

2017–2024 **Ph.D.** in Mathematics Education at University of Michigan, Ann Arbor
Thesis: Beyond the Classroom: Exploring Mathematics Engagement in Online Communities with Natural Language Processing
Advisor: [Deborah Ball](#), Committee: (Cognate) [David Jurgens](#), [Christopher Quintana](#), [Ying Xu](#)

2013–2015 **M.S.** in Mathematics at California Polytechnic State University, San Luis Obispo

2009–2013 **B.S.** in Mathematics at California Polytechnic State University, San Luis Obispo

PUBLICATIONS

JOURNAL PUBLICATIONS AND PEER-REVIEWED CONFERENCE PROCEEDINGS

- In review
1. **Ion, M.**, Collins-Thompson, K. (2025). Bayesian Hierarchical Modeling of Large-Scale Math Tutoring Dialogues. *Joint Statistical Meetings*. (In review)
- In preparation
2. **Ion, M.**, Collins-Thompson, K., Asthana, S. (In preparation). Simulated Teaching and Learning at Scale: Balancing Fidelity and Effectiveness in Tutoring Interactions. *Learning @ Scale 2025*.
 3. **Ion, M.**, Ball, Lowenberg D. (In preparation). Teaching and Learning in the Age of Generative AI: Understanding the Human Work of Instruction. *For the Learning of Mathematics*
- 2023
4. 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*. doi: [10.1007/s40753-023-00216-0](https://doi.org/10.1007/s40753-023-00216-0)

5. 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. doi: [10.5325/jgeneeduc.70.1-2.0149](https://doi.org/10.5325/jgeneeduc.70.1-2.0149)
6. **Ion, M.**, Herbst, P., Ko, I., Hetrick, C. (2023). Surveying Instructors of Geometry for Teachers Courses: An Illustration of Balanced Incomplete Block Design. *Psychology of Mathematics Education, North America Annual Conference*. Reno, NV.
7. 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.
8. 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.
9. 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.
10. 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.
11. **Ion, M.**, Herbst, P. (2022). Conceptions of the Derivative: A Natural Language Processing Approach. *Research in Undergraduate Mathematics Education Conference*. Boston, MA.
- 2020 12. 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.
13. 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.
- 2019 14. **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.
15. 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.
- 2018 16. 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.

BOOK CHAPTERS

- 2024 17. An, T., Boyce, S., Brown, A., Buchbinder, O., Cohen, S., Dumitrascu, D., Escudro, 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

- 2021 18. **Ion, M.**, Herbst, P. (2021). A Contribution to Stewarding the SLOs: Developing SLO Assessment Items and Examining Item Responses. *GeT: The News!*, 3(1).
19. 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).
20. 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*.

POSTERS

- 2025 21. **Ion, M.**, Asthana, S., Jiao, F., Wang, T., Collins-Thompson, K. (2025). Adaptive Knowledge Assessment in Simulated Coding Interviews. *iRAISE Workshop at AAAI Conference*. Philadelphia, PA.
- 2023 22. Boyce, B., **Ion, M.** (2023). Geometry Students' Ways of Thinking About Adinkra Symbols. *Psychology of Mathematics Education, North America Annual Conference*. Reno, NV.
23. Danai, A., Quimper Osore, A., **Ion, M.**, Herbst, P. (2023). Analysis of Citation Networks of Submitted Manuscripts in Mathematics Education. *Undergraduate Research Opportunity Program (UROP) Symposium*. Ann Arbor, MI. 'Blue Ribbon Outstanding Presenter Award'
- 2022 24. Beckemeyer, R., Brown, A., **Ion, M.**, Spiteri, A., Herbst, P. (2022). How Experience and Knowledge Affect the Breaching Patterns of Secondary Mathematics Teachers. *Undergraduate Research Opportunity Program (UROP) Symposium*. Ann Arbor, MI. 'Blue Ribbon Outstanding Presenter Award'.
25. **Ion, M.** (2022). Studying Conceptions of the Derivative at Scale: A Machine Learning Approach. *45th Conference of the International Group for the Psychology of Mathematics Education*. Alicante, Spain.
26. 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. *American Education Research Association*. San Diego, CA.
- 2021 27. Herbst, P. G., Milewski, A. M., **Ion, M.**, Ko, I. (2021). Preparing Teachers for Secondary Geometry: Helping Shape the Geometry Course for Teachers. *National Council of Teachers of Mathematics*. Virtual.

- 2020 28. 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. *Joint Mathematics Meeting*. Denver, CO.
- 2019 29. 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. *Association of Mathematics Teacher Educators Annual Conference*. Orlando, FL.
- 2018 30. **Ion, M.**, Bardelli, E., Herbst, P. (2018). Learning About the Norms of Teaching Practice: How Can Machine Learning Help Analyze Teachers' Reactions to Scenarios? *Michigan Institute for Data Science Annual Symposium*. Ann Arbor, MI. Awarded 'Most Likely Scientific Impact'.

RESEARCH GRANTS

IN REVIEW

- 2025 1. **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)
- With K. Collins-Thompson (PI), C. Brooks (co-PI), and S. Oney (co-PI)
 - Total amount requested: \$2.1 million
2. **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
- With K. Collins-Thompson (PI) and C. Brooks (co-PI)
 - Total amount requested: \$100,000

AWARDED

- 2025 3. **Co-Principal Investigator**, Learning Through Technical Interviews: Combining Data Science Mentorship with AI-Powered Practice (Academic Innovation Fund) (\$12,435)
- With K. Collins-Thompson (co-PI)
- 2017–2023 **Graduate Research Assistant**, GeT Support: An online professional learning community to support the geometry course for teachers (NSF IUSE Grant #1725837) (\$2.3 million)
- PI: P. Herbst

INVITED TALKS & GUEST LECTURES

- 2025 1. **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.
- 2024 2. **Ion, M.** (2024). Use of LLMs and Langchain to Extract Insights about Mathematics Conversations at Scale. A 45-minute talk given to a master's level University of Michigan data science course, SIADS 676: Applications of Generative AI.

- 2023
3. **Ion, M.** (2023). New Directions in Education Research: Harnessing Text-as-Data Methods. San Diego State University, CA. On-Campus Job Talk for Tenure-Track Statistics Education Professor Position.
 4. 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.
 5. 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.
- 2022
6. 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.
 7. 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.
 8. 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. *American Education Research Association*. San Diego, CA.
- 2021
9. Herbst, P. G., Milewski, A. M., **Ion, M.**, Ko, I. (2021). Preparing Teachers for Secondary Geometry: Helping Shape the Geometry Course for Teachers. *National Council of Teachers of Mathematics*. Virtual.
- 2020
10. 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. *Joint Mathematics Meeting*. Denver, CO.
- 2019
11. **Ion, M.**, Margolis, C. (2019). Sources of Justification for College Geometry Instructional Actions. *Graduate Student Community Organization Graduate Student Conference*. Ann Arbor, MI.
 12. Milewski, A., Herbst, P., **Ion, M.**, Bleecker, H. (2019). What do we know about courses in Geometry for Secondary Teachers? *Joint Mathematics Meetings*. Baltimore, Maryland.
- 2018
13. **Ion, M.** (2018). Characterizing University Geometry Courses: An Interview-Based Approach. *Graduate Student Community Organization Graduate Student Conference*. Ann Arbor, MI.

TEACHING

UPLIMIT (FORMERLY CORISE)

2023

Teaching Assistant and Quality Assurance

- Fine-tuning Large Language Models
- Prompt Design and Building AI Products
- Building AI Products with OpenAI

- R for Data Science
- 2023 **Teaching Assistant**, Python for Data Science

UNIVERSITY OF MICHIGAN

- 2018–2019 **Graduate Student Instructor**, Introduction to Quantitative Methods (EDUC 793)
- Fall 2019: 1 section
 - Fall 2018: 1 section

JOHNS HOPKINS UNIVERSITY

- 2018–2019 **Lead Instructor**, Paradoxes and Infinities
- Summer 2019: Hong Kong program
 - Summer 2018: Seattle program

CALIFORNIA POLYTECHNIC STATE UNIVERSITY

- 2017 **Instructor of Record**
- Fall 2017: Calculus for Life Sciences (Math 161), 2 sections
 - Spring 2017: Precalculus (Math 118), 2 sections
 - Spring 2017: Trigonometry (Math 119), 1 section

- 2015 **Instructor of Record**
- Spring 2015: Calculus for Business and Economics (Math 221), 2 sections

- 2014–2015 **Instructor of Record**
- Winter 2015: Precalculus (Math 118), 2 sections
 - Fall 2014: Precalculus (Math 118), 2 sections

- 2013–2014 **Instructor of Record**
- Spring 2015: Calculus for Business and Economics (Math 221), 2 sections
 - Winter 2014: Precalculus (Math 118), 1 section
 - Fall 2013: Precalculus I (Math 116), 1 section

- 2011–2013 **Workshop Facilitator**, Calculus Workshop
- Spring 2013: Calculus II Workshop, 1 section
 - Winter 2013: Calculus III Workshop, 1 section
 - Fall 2012: Calculus II Workshop, 1 section
 - Spring 2012: Calculus III Workshop, 1 section
 - Winter 2012: Calculus II Workshop, 1 section
 - Fall 2011: Calculus I Workshop, 1 section

STUDENTS

GRADUATE STUDENTS

2024–Present Megan Pouncey

2022–2023 Soobin Jeon

2019–2023	Anna Paulson
2018–2023	Jason Godfrey
2019–2021	Matt Park
2018–2020	Davinia Rodriguez-Wilhelm
2019–2020	Scott Bridges

UNDERGRADUATE STUDENTS

2024–Present	Fengquan Jiao, Tianyi Wang
2022–2023	Andre Quimper Osoreo, Amirali Danai, Noah Boudrie
2021–2022	Robert Beckemeyer, Andrew Spiteri
2020–2021	Alan Zhang, Michael Green

SERVICE TO THE COMMUNITY

EDITORIAL BOARD MEMBERSHIPS

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

2022–2025	<p>Journals</p> <ul style="list-style-type: none"> • Investigations in Mathematics Learning • Journal of Engineering Education • Journal for Research in Mathematics Education
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2017–2024	<p>Conferences</p> <ul style="list-style-type: none"> • Psychology of Mathematics Education (PME-NA) • Research in Undergraduate Mathematics Education (RUME) • Geometry Teacher (GeT) Support Conference • University of Michigan Graduate Student Conference (GSCO)
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PROFESSIONAL MEMBERSHIPS

2024–Present	American Statistical Association (ASA)
2017–2024	American Educational Research Association (AERA)
2017–2020	Association of Mathematics Teacher Educators (AMTE)
2017–2024	Graduate Employees' Organization (GEO)

OUTREACH ACTIVITIES

2015–2016	United States Peace Corps Volunteer , Hukuntsi, Botswana
2014	Alternatives to Violence Project , California Men's Colony, San Luis Obispo, CA

PROFESSIONAL DEVELOPMENT PROVIDED

2018 Herbst, P., Milewski, A., Boileau, N., **Ion, M.** (2018). Integrating Geogebra into HS Geometry. 3-Day Workshop in Ann Arbor Public Schools.

PROFESSIONAL TRAINING

2018–2022 Statistics and Machine Learning Reading Group
2021 AERA-ICPSR Workshop
2019 Deep Learning Workshop - Facilitated by Google
2018 Introduction to Deep Neural Networks with Keras/Tensorflow Workshop
2018 Big Data Camp
2018 Machine Learning for Social Scientists Workshop

TECHNICAL SKILLS

Programming Languages: Python, Javascript, Next.js, R, Stata, SQL, \LaTeX , M-Plus, C++

Statistical Models: Linear and Logistic Regression, Multi-level Models, Psychometric Models, Structural Equation Models, Bayesian Methods, Causal Inference Methods, Time Series Analysis

Machine Learning and NLP: PyTorch, Transformers, HuggingFace, NLTK, Spacy, Scikit-Learn, Pandas, Numpy, Matplotlib, Tensorflow, LangChain, Vector Databases (Pinecone, ChromaDB, Faiss)

RESEARCH EXPERIENCE

2017–2023 **Research Assistant**, GRIP Lab, University of Michigan
2020–2022 **Research Assistant**, College and Beyond II Project (Mellon Grant)
2019 **Research Assistant**, Wolverine Pathways Curriculum Development Project
2013 **Research Experience for Undergraduates (REU)**, California Polytechnic State University

HONORS, AWARDS & FELLOWSHIPS

2023 Candidacy Tuition Fellowship, University of Michigan (One semester funding + healthcare)
2023 ES Mini Grant, School of Education, University of Michigan (\$1100)
2023 Undergraduate Research Opportunity Program (UROP) Mentor Nominee
2022 Rackham Debt Management Award, University of Michigan (\$15000)
2022 School of Education Travel Grant
2021 Harold and Vivian Shapiro/John Malik/Jean Forrest Award (\$2000)
2021 Jones-Payne-Coxford Award (One semester of full funding + healthcare)

2021	Educational Studies Summer Grant, University of Michigan (\$2500)
2019	Educational Studies Summer Grant, University of Michigan (\$5000)
2018	Most Likely Transformative Science Impact Award (\$100)
2017–Present	School of Education Scholar Award (Full funding + healthcare for at least four years of study)
2015	Outstanding Teaching Associate Award (\$500), California Polytechnic State University
2014	Marie Porter Lehman Math Educator Scholarship (\$1500), California Polytechnic State University
2013	Bryant Russell Memorial Award (\$1500), California Polytechnic State University