

Mike Ion

2007 Medford Rd. Apt. 253
Ann Arbor, MI 48104
✉ mikeion@umich.edu
🌐 www.mikeion.com

Education

- 2017–Present **Ph.D., Mathematics Education**, University of Michigan.
(In progress) Advisor: Pat Herbst
- 2013-2015 **M.S., Mathematics**, Cal Poly.
Advisor: Ben Richert
- 2009-2013 **B.S., Mathematics**, Cal Poly.

Research Interests

I am interested in understanding mathematics teachers' and students' knowledge through their use of language in mathematics settings. Methodologically, this involves using machine learning/natural language processing to train models to analyze their dialogue. I aspire to specialize as a methodologist working on interdisciplinary projects.

Research Experience

- Feb. 2021 - Present **Editorial Assistant - Journal for Research in Mathematics Education (JRME)**, NCTM, Ann Arbor, MI.
My primary role as editorial assistant for JRME is to check the statistical methods or advanced math (both text and tables/figures) of the manuscripts in review for typos and errors as well as read through the text to make sure that the grammar and style are clearly communicating what the statistics show.
- Sept. 2017 - Present **Graduate Student Research Associate - Geometry, Reasoning, and Instructional Practices (GRIP) Lab**, University of Michigan, Supervisor: Pat Herbst.
I primarily serve as a research assistant working on an NSF Grant studying the undergraduate geometry course (NSF Award Number: 1725837). Some responsibilities include:
- Conducting item-response theory (IRT) analysis of results from mathematical knowledge for teaching (MKT) assessments, and distribute reports to instructors.
 - Coding qualitative data (e.g., interview data, survey responses) manually and with machine learning models)
 - Organizing working groups for an online professional development network of university geometry instructors.
 - Writing conference papers and presenting research at national conferences.
- Apr. 2020 - Present **Graduate Student Research Associate - College and Beyond II Project (Mellon Grant)**, University of Michigan, Supervisor: Anne Gere.
I am responsible for running statistical analyses and providing insight to a research team studying the effects of a liberal arts education on life outcomes. Some responsibilities include:
- Working on a team to analyze results from a pilot survey to determine next steps forward.
 - Providing readability statistics on a set of essay responses.
 - Connecting responses on a pilot survey using structural equation modeling.

- May 2019 - **Graduate Student Research Apprentice - Wolverine Pathways Curriculum Development Project**, University of Michigan, Supervisor: Maisie Gholson.
Dec. 2019
Responsibilities included:
- Working on a team to develop social-justice oriented curriculum materials for a summer mathematics program.
 - Facilitating a professional development workshop for Wolverine Pathways teachers.
 - Advising team members on survey methodologies.

Publications

Peer-Reviewed Conference Proceedings

- Feb. 2022 **Conceptions of the Derivative: A Natural Language Processing Approach**, Research in Undergraduate Mathematics Education Conference. Boston, MA..
Ion, M, Herbst, P.
- Nov. 2020 **Understanding instructional capacity for high school geometry as a systemic problem through stakeholder interviews**, Psychology of Mathematics Education, North America. Mexico..
Margolis, C., **Ion, M.**, Herbst, P., Milewski, A., Shultz, M.
- Apr. 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..
Bardelli, E., **Ion, M**, Ko, I., Herbst, P.
- Nov. 2019 **Developing Practical Measures To Support the Improvement of Geometry for Teachers Courses**, Psychology of Mathematics Education, North America Annual Conference. St. Louis, MO.
Ion, M., Herbst, P., Margolis, C., Milewski, A., Ko, I.
- Apr. 2019 **Tensions in Teaching Mathematics to Future Teachers: Understanding the Practice of Undergraduate Mathematics Instructors**, American Education Research Association Conference. Toronto, Canada.
Milewski, A., **Ion, M.**, Herbst, P., Shultz, M., Ko, I., Bleecker, H.
- Oct. 2018 **What Influences Do Instructors of the Geometry for Teachers Course Need to Contend With?**, Psychology of Mathematics Education, North America. Greenville, SC.
Herbst, P., Milewski, A., **Ion, M.**, Bleecker, H.

Conference presentations

- Jan. 2020 **State of Undergraduate Geometry Courses for Secondary Teachers: Curriculum, Instructional Practices, and Student Achievement**, Joint Mathematics Meeting. Denver, CO.
Herbst, P., Stevens, I., Milewski, A., **Ion, M.**, Ko, I.
- Mar. 2019 **Sources of Justification for College Geometry Instructional Actions**, Graduate Student Community Organization Graduate Student Conference. Ann Arbor, MI.
Ion, M., Margolis, C.
- Feb. 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.
Milewski, A., Herbst, P., **Ion, M.**, Bleecker, H.
- Jan. 2019 **What do we know about courses in Geometry for Secondary Teachers?**, Joint Mathematics Meetings, Baltimore, Maryland.
Milewski, A., Herbst, P., Margolis, C., **Ion, M**, Ko, I., Akbuga, E.

- Oct. 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.
Ion, M., Bardelli, E., Herbst, P.
 Awarded 'Most Likely Scientific Impact'
- Mar. 2018 **Characterizing University Geometry Courses: An Interview-Based Approach**, Graduate Student Community Organization Graduate Student Conference Ann Arbor, MI.
Ion, M.
- [Non-peer-reviewed articles, blog posts, proceedings, and white papers](#)
- Nov. 2021 **A Contribution to Stewarding the SLOs: Developing SLO Assessment Items and Examining Item Responses.**, GeT: The News!, 3 (1). <https://www.gripumich.org/v3-i1-f2021/a-contribution-to-stewarding-the-slos-developing-slo-assessment-items-and-examining-item-responses>.
Ion, M., Herbst, P.
- Nov. 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). <https://www.gripumich.org/v3-i1-f2021/a-deeper-dive-into-an-slo-item>.
 Herbst, P., **Ion, M.**
- May 2021 **Best-Laid Co-Plans for a Lesson on Creating a Mathematical Definition.**, AMS Blogs: On Teaching and Learning Mathematics. <https://blogs.ams.org/matheducation/2021/05/06/best-laid-co-plans-for-a-lesson-on-creating-a-mathematical-definition/>.
 Boyce, S., **Ion, M.**, Lai, Y., McLeod, K., Pyzdrowski, L., Sears, R., St. Goar, J.
- [Invited Talks](#)
- Mar. 2021 **Measuring Liberal Education: A Report from the College and Beyond II Study at the University of Michigan**, College and Beyond II: Liberal Arts and Life Colloquium Series, Ann Arbor, MI..
 Courant, P., Flaster, A., Koester, B., Paulson, N., Gere, A., Godfrey, J., **Ion, M.** Limlamai, N., Moos, A. Van Zanen, K.
- Nov. 2019 **What Do We Mean by Equity: A Topic Modeling Approach**, Education in Mathematics, Science, and Technology Research Interdisciplinary Workshop. Ann Arbor, MI.
Ion, M., Robinson, D.

Teaching Experience

- Sept. 2018 - Present **Graduate Student Instructor.**
 University of Michigan. Ann Arbor, MI.
 I serve as a teaching assistant for the graduate-level Introduction to Quantitative Methods course (EDUC 793) provided in the School of Education. Responsibilities include:
- Delivering weekly lab instruction to 20 students on supplementing their statistics learning through the use of Stata software.
 - Attending lecture and providing instructional support to students.
 - Grading homework, exams, and final papers.

- Jul. 2019 & **Instructor for John Hopkins University CTY Summer Program.**
 Jul. 2018 Hong Kong University. Hong Kong, S.A.R. & Seattle University. Seattle, WA.
 Primary instructor for course titled *Paradoxes and Infinities* during the summers of 2018 and 2019.
 These courses had around 20 students from around the world. Responsibilities included:
- Developing curriculum for 100+ contact hours in the classroom.
 - Writing written evaluations for all students
 - Supervising the work of a teaching assistant.
- Jan. 2017 - **Lecturer - Mathematics Department.**
 Jul. 2017 Cal Poly. San Luis Obispo, CA.
 Served as instructor of record for the following courses:
- Precalculus (Math 118)
 - Trigonometry (Math 119)
 - Calculus for Business and Economics (Math 221)
 - Calculus for the Life Sciences (Math 161)
- Sept. 2013 - **Graduate Teaching Associate (Instructor of Record).**
 Jun. 2015 Cal Poly. San Luis Obispo, CA.
 Served as instructor of record for the following courses:
- Precalculus (Math 116, Math 118)
 - Calculus for Business and Economics (Math 221)
- Sept. 2011 - **Calculus Workshop Facilitator.**
 Jun. 2013 Cal Poly. San Luis Obispo, CA.
 Workshop coordinator for Calculus I, II, and III courses. Responsibilities included:
- Attending the content course
 - Preparing worksheets, mock quizzes and exams, and games
 - One-on-one meetings with students
 - Meeting weekly with course instructor and Math Program Staff
 - Running a workshop with 10-25 students, assisting and guiding them through the content.
- Jun. 2011 - **Residential Counselor/Teaching Assistant for EPGY Summer Institutes.**
 Aug. 2012 Stanford University. Palo Alto, CA.
 A full-time residential position during the summers of 2011 and 2012. I provided educational support for mathematics courses for gifted middle school students.

Awards

- October 2021 **Harold and Vivian Shapiro/John Malik/Jean Forrest Award**, (\$2000).
 University of Michigan
- March 2021 **Jones-Payne-Coxford Award**, (One semester + healthcare).
 University of Michigan
- Sept. 2017-
 Present **School of Education Scholar Award**, (Full tuition + healthcare).
 University of Michigan
- April 2021 **Educational Studies Summer Grant**, (\$2500).
 University of Michigan
- April 2019 **Educational Studies Summer Grant**, (\$5000).
 University of Michigan
- October 2018 **Most Likely Scientific Impact**, (\$100).
 University of Michigan Data Science Symposium
- June 2015 **Outstanding Teaching Associate Award**.
 Cal Poly

Professional Development

- Nov. 2019 **Deep Learning Workshop**, led by Google.
- Jun. 2018 **Introduction to Deep Neural Networks with Keras/Tensorflow Workshop**, led by Greg Teichert.
- May. 2018 **Big Data Camp**, led by Interdisciplinary Committee on Organizational Studies at University of Michigan.
Worked with a team of grad students on a big data project looking at success rates of NSF grants based on language use. Code can be found at: <https://github.com/mikeion/NSF-Awards-Project>
- Mar. 2018 **An Introduction to Machine Learning for Social Scientists Workshop**, led by Jake Hofman from Microsoft Research.

Skills

- Computing Python (advanced), Stata (intermediate), M-Plus (intermediate), Git (intermediate), R (beginner)
- Spoken Languages English, Spanish (intermediate), Farsi (beginner), Setswana (beginner)
- Specialties Natural Language Processing, Statistics, Psychometrics, Structural Equation Modeling

(Recent) Relevant Coursework

- University of Michigan Natural Language Processing: Algorithms and People (SI 630); Systemic Functional Linguistics (EDUC 737); Introduction to Quantitative Methods (EDUC 793); Quantitative Methods for Non-Experimental Research (EDUC 795); Psychometrics (EDUC 707); Structural Equation Modeling (EDUC 803)
- Datacamp.com Introduction to Python; Intermediate Python; Python Data Science Toolbox (Part 1 and Part 2); Supervised Learning with Sklearn; Introduction to Importing Data with Python; Intermediate Importing Data with Python; Introduction to Natural Language Processing in Python

Service

- Jan. 2021-Present **Editorial Assistant**, *Ann Arbor, MI*, Journal for Research in Mathematics Education.
 - Serve as a assistant editor/reviewer for manuscripts involving statistical methodologies.
 - Review and analyze anonymous survey data filled out by those who submit and review for the journal.
- Jun. 2015 - May 2016 **Peace Corps Volunteer**, *Botswana*.
 - Served as a mentor for an HIV-awareness youth group and a chess club.
 - Acted as a health promoter while training young people to serve as peer educators, enabling them to provide HIV/AIDS education and awareness to other youth and adults in their communities.
 - Inside and outside the classroom work developing a math curriculum at a low-income junior secondary school.
 - Advanced-Mid proficiency on the Language Proficiency Interview in the local language (Setswana)
- Dec. 2014 **Alternatives to Violence Project**, *California Men's Colony*.
 - Served as a volunteer for a two-day workshop aimed at providing inmates advice on understanding why conflict happens and strategies for communicating in difficult situations.