

Kristin M. Frank
Curriculum Vitae

Towson University
Department of Mathematics
8000 York Road
Towson, Maryland 21252
kfrank@towson.edu
Website: wp.towson.edu/kfrank

EDUCATION

- Ph.D. Mathematics Education – Arizona State University, 2017
Dissertation: Examining the Development of Students’ Covariational Reasoning in the Context of Graphing
Advisors: Patrick Thompson, co-chair, Marilyn Carlson, co-chair
Committee: Fabio Milner, Kyeong Hah Roh, Michelle Zandieh
- M.A. Mathematics Education – Arizona State University, 2015
- Graduate Certificate in Statistics – Arizona State University, 2015
- B.S. Mathematics – Virginia Polytechnic Institute and State University, 2012 (Summa Cum Laude)
B.Arch Architecture – Virginia Polytechnic Institute and State University, 2012 (Summa Cum Laude)
Thesis: The Necessity for Subjective Judgment in Algorithmic Architecture
Advisor: Dr. Hilary Bryon

PROFESSIONAL APPOINTMENTS

Assistant Professor of Mathematics Education, Towson University, Department of Mathematics, Towson, MD, August 2017 - Present

PUBLICATIONS

Journal Articles

- Frank, K., Kolesnikov, A., Wang, X. (under review). Comparing placement policies at a four year institution.
- Frank, K. (Accepted 2021). The structure of the quadratic formula. *Mathematics Teacher: Learning and Teaching PK-12*.
- Frank, K. and Thompson, P.W. (Accepted 2021). School students’ preparation for Calculus in the United States. *ZDM-Mathematics Education*
- McNicholl, T.H., Frank, K., Hogenson, K., Roat, J., Carlson, M.P. (2020). Improving student success and supporting student meaning-making in large-lecture precalculus classes. *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*.
<https://doi.org/10.1080/10511970.2020.1737850>

Tallman, M., Frank, K. (2020). Angle measure, quantitative reasoning, and instructional coherence: An examination of the role of mathematical *ways of thinking* as a component of teachers' knowledge base. *Journal of Mathematics Teacher Education*. <https://doi.org/10.1007/s10857-018-9409-3>

Refereed Conference Proceedings

Corum, K., Spitzer, S., Frank, K. (2021). Developing TPACK for Makerspaces to Support Mathematics Teaching and Learning. *Proceedings of the 42nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*.

Frank, K., Talbert, R. (2019). Composing the composite function: Examining students' meanings for function composition. *Proceedings of the 41st Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*.

Cornwell, C., Frank, K., McNew, N. (2019). The reality of common grading: One aspect of a calculus coordination effort. *Proceedings of the 41st Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*.

Spitzer, S., Corum, K., Frank, K., Kara, M. (2019). Modeling for social justice: A model-eliciting activity on Gerrymandering. *Proceedings of the 41st Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*.

Frank, K. (2018). The Relationship Between Students' Covariational Reasoning When Constructing and Interpreting Graphs. *Proceedings of 21st Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education*. San Diego, CA: RUME.

Frank, K. (2017). Tinker Bell's Pixie Dust: The role of differentiation in emergent shape thinking. *Proceedings of the 20th Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education*. San Diego, CA: RUME.

Frank, K. (2016). Plotting points: Implications of "over and up" on students' covariational reasoning. In Wood, M.B., Turner, E. E., Civil, M., & Eli, J.A. (Eds.), *Proceedings of the 38th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, pp. 573-580. Tucson, AZ: The University of Arizona.

Frank, K. (2016). Students' conceptualizations and representations of how two quantities change together. In T. Fukawa-Connelly, N.E. Infante, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 19th Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education*. Pittsburgh, PA: RUME.

Fowler, B., Frank, K., Yoon, H., Carlson, M.P. (2013). Reasoning abilities that support students in developing meaningful formulas to relate quantities in an applied problem context. *Proceedings of the 16th Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education*. Denver, CO: Northern Colorado University.

Published Abstracts

Cornwell, C., Frank, K., McNew, N. (2019, January). Using computing software in Calculus I: Replacing coding with dynamic visualizations. *Published abstract in Joint Math Meetings Contributed Paper Session*. San Diego, CA,

Liu, Y., Schmitz, R., Frank, K., Cheng, D. (2019, January). Illuminating the Mathematics of Figure Skating: Bringing STEM Activities to Figure Skating Camps. *Published abstract for Joint Math Meetings Poster Session on Mathematical Outreach Programs.*

Schmitz, R., Liu, Y., Frank, K. (2019, January). Teaching rigid motions through embodied activities: Making the jump from 2- to 3- dimensions. *Published abstract in Joint Math Meetings Contributed Paper Session.*

Frank, K. (2018, August). Constructing Formulas from Dynamic Images: What Happens When Nothing Stays the Same? *Published Abstract for MathFest Contributed Paper Sessions.* Denver, CO.

Schmitz, R., Frank, K. (2018, August). Students' Mathematical Modeling of One-Point Perspective Paintings. *Published Abstract for MathFest Contributed Poster Session.* Denver, CO.

WORK WITH STUDENTS

Posters with Students

Frank, K., Talbert, R. (2019). Composing the composite function: Examining students' meanings for function composition. *Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education Poster Session.*

Talbert, R., Frank, K. (2019). An Analysis of Meanings for Function Composition Supported by Written Curricula. *Towson University's OURCI Research and Creative Inquiry Forum.*

Liu, Y., Schmitz, R., Frank, K., Cheng, D. (2019). Illuminating the Mathematics of Figure Skating: Bringing STEM Activities to Figure Skating Camps. *Joint Math Meetings Poster Session on Mathematical Outreach Programs.*

Schmitz, R., Frank, K. (2018). Students' Mathematical Modeling of One-Point Perspective Paintings. *Mathematical Association of America's MathFest Contributed Poster Session.*

Schmitz, R., Frank, K. (2018). Students' Mathematical Modeling of One-Point Perspective Paintings. *Towson University's OURCI Research and Creative Inquiry Forum.*

Conference Presentations by my Students

Liu, Y. (2019, February). *Cultural Comparisons in Mathematics Education.* Presentation at the Association of Maryland Mathematics Teacher Educators (AMMTE) Early Career Conference.

Schmitz, R., Liu, Y., Frank, K. (2019, January). *Teaching rigid motions through embodied activities: Making the jump from 2- to 3- dimensions.* Presentation at Joint Math Meetings Contributed Paper Session.

Liu, Y., Cunningham, B. (2018, October). *Barycenters in our Solar System.* Presentation at the 2018 Maryland Council of Teachers of Mathematics Annual Conference.

Schmitz, R. (2018, January). *Vanishing points in paintings: An algebra educational activity.* Presentation at Joint Math Meetings Contributed Paper Session.

GRANTS

STEM Model-Eliciting Activities for Middle School Students, funded by Mathematics Association of America's Dolciani Mathematics Enrichment Grants (\$5,000), with Cheng, D. (PI), Corum, K. (co-PI), Frank, K. (co-PI), Kara, M. (co-PI), Krach, R. (co-PI), & Spitzer, S (co-PI). (Awarded 2020 ; due to CoVID-19, postponed until 2021-2022).

Transforming Mathematics Instruction through Modeling, Making, and Mentoring, an NSF Noyce Capacity Building Grant (\$75,000), with Sandy Spitzer (PI), Diana Cheng, and Kimberly Corum (2019 – 2020).

STEM Education Research on Model Eliciting Activities – an internal grant funded by Towson University's Fisher College of Science and Mathematics General Endowment Fund (\$21,476), with Diana Cheng (PI), Kimberly Corum, Melike Kara, Mike Krach, Deepika Menon, and Sandy Spitzer (2019 – 2020).

Mathematics Education Research on Model-Eliciting Activities – an internal grant funded by Towson University's Fisher College of Science and Mathematics General Endowment Fund (\$14,580) with Diana Cheng (PI), Kimberly Corum, Melike Kara, and Sandy Spitzer (2018 – 2019).

Bringing 3D Printing and Digital Cutting to Baltimore City Students, funded by Constellation Community Grant (\$500), PI with Diana Cheng and Kimberly Corum (2018 – 2019).

Students' Construction of Multiplicative Objects in the Context of Graphing (\$4,479) - an internal grant funded by Arizona State University Block Grant for Summer Research Support (2017).

Exploring Conveyed Meanings of Function Composition (\$33,000) – an internal grant funded by Graduate Assistance in Areas of National Need Fellowship (2013 – 2015).

The Role of Teachers' Beliefs on their Perceived Classroom Practices (\$6,455) – an internal grant funded by Arizona State University Block Grant for Summer Research Support (2013).

PRESENTATIONS

Conference Presentations

Frank, K., Talbert, R. (2019, November). Composing the composite function: Examining students' meanings for function composition. *Poster Presentation at Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education*. St. Louis, MO: PMENA.

Cornwell, C., Frank, K., McNew, N. (2019, November). The reality of common grading: One aspect of a calculus coordination effort *Poster Presentation at Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education*. St. Louis, MO: PMENA.

Spitzer, S., Corum, K., Frank, K., Kara, M. (2019, November). Modeling for social justice: A model-eliciting activity on Gerrymandering. *Poster Presentation at Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education*. St. Louis, MO: PMENA.

- Frank, K., and Talbert, R. (2019, October). Integration: More than area under a curve. *Presentation at the annual conference of the Maryland Council of Teachers of Mathematics*. Dundalk, MD: MCTM.
- Frank, K. M. (2018, August). *Constructing Formulas from Dynamic Images: What Happens When Nothing Stays the Same?* MathFest Contributed Paper Sessions. Denver, CO.
- Frank, K. (2018, February). *The Relationship Between Students' Covariational Reasoning When Constructing and Interpreting Graphs*. 21st Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education. San Diego, CA: RUME
- Frank, K. (2017, February). *Tinker Bell's Pixie Dust: The role of differentiation in emergent shape thinking*. 20th Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education. San Diego, CA: RUME
- Frank, K. (2017, January). *Examining the role of experiential time in students' covariational reasoning*. The Joint Mathematics Meetings. Atlanta, GA: MAA
- Frank, K. (2016, November). *Plotting points: Implications of "over and up" on students' covariational reasoning*. 38th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Tucson, AZ: PMENA.
- Frank, K. (2016, February). *Students' conceptualizations and representations of how two quantities change together*. 19th Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education. Pittsburgh, PA: RUME.
- Fowler, B., Frank, K., Yoon, H., Carlson, M.P. (2013, February). *Reasoning abilities that support students in developing meaningful formulas to relate quantities in an applied problem context*. 16th Meeting of the MAA Special Interest Group on Research in Undergraduate Mathematics Education. Denver, CO.

Invited Talks

- Frank, K. (2018, April). *The Relationship Between Students' Covariational Reasoning When Constructing and Interpreting Graphs*. Semiannual meeting of the Philadelphia CoMERG at St. Joseph's University.

AWARDS

- Graduate and Professional Student Association Teaching Excellence Award, 2016
- Floyd L. Downs Teaching of Mathematics Fellowship Award, 2015, \$1,000

TEACHING EXPERIENCE

- Assistant Professor of Mathematics Education, Towson University, Towson, MD (2017 – Present)
- Teaching Assistant in Mathematics Education, Arizona State University, Tempe, AZ (2012 – 2017)

COURSES TAUGHT

Towson University

MATH 204	Mathematical Concepts and Structures I (Fall 2017, Spring 2018)
MATH 205	Mathematical Concepts and Structures (Fall 2018)
MATH 211	Calculus for Business Applications (Spring 2021)
MATH 273	Calculus I (Spring 2018, Fall 2018)
MATH 310	Functions and Modeling (Fall 2017, Spring 2019, Spring 2020)
MATH 420	Applications of Technology for Secondary School Teachers (Spring 2020)
MATH 423	Teaching Mathematics in the Secondary Schools (Fall 2019)
MATH 426	Internship in Secondary Education-Mathematics (Spring 2019)
MATH 523	Teaching Mathematics in the Secondary Schools (Fall 2019)
MATH 680	Special Topics: Noticing Students' Mathematical Thinking (Summer 2019)
MTED 611	Algebra for Middle School Teachers (Fall 2019)
MTED 611	Algebra Through the Curriculum (Spring 2020)
MTED 614	Calculus Through Technology for Middle School Teachers (Spring 2019)
SEMS 240	Classroom Interactions (Fall 2019)

Arizona State University

MTE 482	Methods of Teaching Mathematics in Secondary School (Fall 2015, Spring 2016, Fall 2016)
MTE 591	Mathematics Education Seminar for Graduate Students – (co-taught Fall 2014 and Spring 2015)
MAT 170	Precalculus – using research based curriculum (Fall 2012, Spring 2013, and Fall 2014)

PROFESSIONAL SERVICE

National Level Service

Communications Officer for the Special Interest Group of the Mathematical Association of America on Mathematics and Sports (2018 – 2019)
Committee Member for the College Board Pre-AP Mathematics Content Development Committee (August 2018 – present)

Manuscript and Conference Reviewer

Reviewer for *Journal of Mathematics Teacher Education* (2021 – present)
Reviewer for *Mathematics Teacher Educators* (2020 – present)
Reviewer for *Bannekar Banner* (2019 – present)
Reviewer for *Mathematics Teacher: Learning and Teaching Pre-K–12* (2019 – present)
Reviewer for *International Journal of Research in Education and Science* (2018 – present)
Content Reviewer for Educational Testing Service (ETS) (2018)
Reviewer for *Journal of Mathematical Behavior* (2018 – present)
Reviewer for *Journal of Research in Mathematics Education* (2017 – present)
Reviewer for the Annual Conference on Research in Undergraduate Mathematics Education (2017, 2018)
Reviewer for the Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education (2016, 2019)

Workshops & Teacher Professional Development

- College Board Grade 10 Geometry with Statistics Readiness Workshop; a workshop for in-service secondary mathematics teachers (July 2019, August 2019)
- Project Pathways Algebra I professional development workshop for in-service secondary teachers, STRIVE Preparatory Schools (September 2016)

- Project Pathways Algebra I, Algebra II, and Precalculus professional development workshop for in-service secondary teachers, STRIVE Preparatory Schools (August 2016)
- Project Pathways Precalculus professional development workshop for graduate teaching assistants, Arizona State University (August 2016)
- Project Pathways quantitative reasoning professional development workshop for in-service middle school teachers, STRIVE Preparatory Schools (January 2016)
- Project Pathways Algebra I and Algebra II professional development workshop for in-service secondary teachers, STRIVE Preparatory Schools (January 2016, August 2016)
- Pathways TUME professional development initiative for graduate teaching assistants, Arizona State University (August 2014 – May 2015)
- Project Pathways Precalculus professional development workshop for graduate teaching assistants and faculty, Arizona State University (August 2014)
- Project Pathways Algebra I and Precalculus professional development workshop for in-service secondary teachers, Chandler Public Schools & Scottsdale Unified School District (June 2013)

Educational Consultant STRIVE Preparatory Schools, Denver, Colorado (2015 – 2017)

PROFESSIONAL AFFILIATIONS

Association of Maryland Mathematics Teacher Educators (2018 – present)

Special Interest Group of the Mathematical Association of America on Mathematics and Sports (2018 – 2019)

Mathematical Association of America (2017 – present)

Maryland Council of Teachers of Mathematics (2017 – present)

Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education (2017 – present)

National Council of Teachers of Mathematics (2016 – present)