Michael Duane Hicks
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EDUCATION

Ph.D., Mathematics Education, May 2021
    Texas State University

M.S., Mathematics, December 2015
    Texas State University

B.S., Mathematics, December 2013
    Texas State University

RESEARCH EXPERIENCE

Characterizing Critical Aspects of Mathematics Classroom Discourse, PI: Jessica Pierson Bishop, NSF DRL-1649979, Research Assistant, Texas State University, Spring 2018-Present
    My role in this project has been to help identify the construct of authority as a focal point of analysis, develop and apply a coding scheme for authority, and interpret and disseminate results from analysis.

Orchestrating Discussions Around Proof, PI: Kathleen M. Melhuish; Co-PIs: Kristen M. Lew, Paul C. Dawkins, NSF DUE-1836559, Research Assistant, Texas State University, Fall 2018-Present
    My role in this project has been to assist in task design and refinement as we iteratively implement tasks in interviews with the goal of scaling the tasks up to a whole class setting. In addition, I routinely observe and take part in the modern algebra classes from which data for the project are collected.

University Research Assistant, Texas State University, Supervisor: Kristen M. Lew. Fall 2018.
    My role on this one-semester assistantship was to (1) compile literature relevant to the construct of *mathematical maturity*, and (2) open code interviews related to the language used by professors while they assessed and graded student proofs.

University Research Assistant. Texas State University, Supervisor: Kathleen M. Melhuish. Spring 2018.
    Beginning in the Spring of 2018, I collaborated on project designed to investigate abstract algebra students' understanding of function. My role in these projects included assisting in designing survey and interview questions, conducting interviews with students, and analyzing the data.

University Research Assistant. Mathworks at Texas State University, Supervisors: Hiroko Warshauer, Max Warshauer. June-August 2017, June-July 2018, Summer 2021
    I worked for two summers for *Mathworks*, a summer math camp located at Texas State University. My responsibilities while working for Mathworks were (1) teach sections of the Junior Summer Math Camp, (2) assist in the development of practitioner articles, and (3) assist in the development of research projects related to the camp.

    In the summer of 2021, I supervised a small team of undergraduates in learning how to apply qualitative coding and data analysis to explore a problem in mathematics education research. In particular, we implemented methods related to grounded theory to investigate how students make sense of proofs in undergraduate analysis/advanced calculus.

PUBLICATIONS

Journal Publications

Melhuish, K., Ellis, B. & **Hicks, M.D.** (2020). Group theory students' perceptions of binary operation. *Educational Studies in Mathematics, 103(1), 63-81.*

Melhuish, K., Lew, K., **Hicks, M.D.** & Kandasamy, S. (2020). Coherence of abstract algebra students' evoked concept images for functions and homomorphisms. *Journal of Mathematical Behavior, 60, 1-16.*

Melhuish, K., Lew, K.M. & **Hicks, M.D.** (2020). Comparing student proofs to explore a structural property in abstract algebra. *PRIMUS, 31(1),* 1-17.

Book Chapters

Melhuish, K. M., Lew, K. M., **Hicks, M. D.**, Guajardo, L. R., Dawkins, P. C., & Morey, S. (n.d.). Proving, analyzing, and deepening understanding of a structural property in abstract algebra. In *Building a Shareable Knowledge Base for Teaching in Collegiate Mathematics*. Washington, D.C., United States of America: Mathematics Association of America.

Melhuish, K.M. & **Hicks, M.D.** (2019). A validity argument for an undergraduate mathematics concept inventory. In Bostic, J., Krupa, E. & Shih, J. (Eds.), *Quantitative measures of mathematical knowledge: Researching instruments and perspectives* (pp. 121-151). New York, NY: Taylor & Francis.

Refereed Conference Proceedings

Hicks, M.D., Tucci, A., Koehne, C., Melhuish, K.M. & Bishop, J.P., (accepted). Examining the distribution of authority in an inquiry-oriented abstract algebra environment. RUME 2021

Hicks, M.D. (accepted). Conjecturing theorem statements and their proofs by analogy: The case of Andrew. PMENA 2021.

Bishop, J.P., **Hicks, M.D.** & Koehne, C., (accepted). Mathematical authority in authoring, animating, & assessing mathematical ideas. PMENA 2021.

Hicks, M.D. (2020). Developing a framework for characterizing student analogical activity in mathematics. In A.I. Sacristán, J.C. Cortés-Zavala& P.M. Ruiz-Arias, (Eds.). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Mexico* (pp. 914 - 921).

Hicks, M.D. (2020). Student mathematical activity during analogical reasoning in abstract algebra. *Proceedings of the 23rd Annual Conference on Research in Undergraduate Mathematics Education. Boston, Massachusetts.* (pp. 1010 - 1015).

Hicks, M.D., Guajardo, L., Melhuish, K., Lew, K. & Dawkins, P. (2020). An overview of the orchestrating discussion around proof (ODAP) project. *Proceedings of the 23rd Annual Conference on Research in Undergraduate Mathematics Education. Boston, Massachusetts.* (pp. 1187 - 1188).

Hicks, M.D., Warshauer, H.K., Warshauer, M.L., (2020). Student perceptions of support provided by a summer math camp. (ICME, 2020, Accepted)

Lambert, E. H., **Hicks, M. D.**, Koehne, C. R., & Bishop, J. L. (2019). The power of words spoken: How authority influences discourse. In S. Otten, A. G. Candela, Z. de Araujo, C. Haines, & C. Munter (Eds.) Proceedings of the forty-first annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA) (pp. 1763–1764).

Melhuish, K. M., Lew, K. M., Kandasamy, S., & **Hicks, M. D.** (2019). Function coherence in advanced mathematics. In S. Otten, A. G. Candela, Z. de Araujo, C. Haines, & C. Munter (Eds.) Proceedings of the forty-first annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA) (pp. 961–966).

Melhuish, K., Lew, K., **Hicks, M.D.** & Kandasamy, S. (2019). Abstract algebra students' function-related understanding and activity. In Weinberg, A., Moore-Russo, D., Soto, H., & Wawro, M. (Eds.), *Proceedings of the 22nd Annual Conference on Research in Undergraduate Mathematics Education.* (pp. 419-427). Oklahoma City, OK.

Hicks, M.D., Warshauer, H. & Warshauer, M. (2018). Development of mathematics competence, identity, and sense of belonging to a community of mathematics learners. In T.E. Hodges, G. J. Roy, & A. M. Tyminski, (Eds.), *Proceedings of the 40th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 962-965). Greenville, SC: University of South Carolina & Clemson University.

Melhuish, K. & **Hicks, M.D.** (2018). Student understanding of the general binary operation concept. In T.E. Hodges, G. J. Roy, & A. M. Tyminski, (Eds.), *Proceedings of the 40th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 548-555). Greenville, SC: University of South Carolina & Clemson University.

Manuscripts/Proposals Under Review or in Preparation

Bishop, J.P., Koehne, C. & **Hicks, M.D.** (under review, resubmitted December 2021). By whose authority? Negotiating authority for modes of activity in the mathematics classroom. *For the Learning of Mathematics.*

Hicks, M.D. (revise and resubmit, October 2021). Analogical Reasoning as a Way of Thinking in Advanced Mathematics. *For the Learning of Mathematics.*

Hicks, M.D. (in preparation). The Analogical Reasoning in Mathematics Framework. Intended Journal: *Educational Studies in Mathematics.*

Hicks, M.D. (in preparation). Exploratory Structure Creation Through Reasoning by Analogy in Abstract Algebra. Intended Journal: *PRIMUS.*

Hicks, M.D., Warshauer, H. & Warshauer, M. (submitted). Student perceptions of support provided by a summer mathematics program.

PRESENTATIONS

Conference Presentations

Hicks, M.D. (2018, November). *Student understanding of the general binary operation concept.* Paper presented at the 40th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Greenville, SC.

Other Presentations

Hicks, M.D. (2021, November). Expanding Perspectives on Analogical Reasoning in Mathematics Education. Virginia Tech Mathematics Education Seminar. Blacksburg, Va.

Hicks, M.D. (2021, September). By Whose Authority? An Examination of Mathematical Authority in the Classroom. Virginia Tech Mathematics Education Seminar. Blacksburg, Va.

Hicks, M.D. (2020, February). Investigating student's mathematical analogizing activity in abstract algebra. Texas State University Mathematics Education Seminar. San Marcos, Tx.

Bishop, J.P., **Hicks, M.D.**, Koehne, C. & Lambert, E. (2019, November). Who's the boss?: Mathematical authority in middle-grades classrooms. Texas State University Math Graduate Programs Expo. San Marcos, Tx.

Hicks, M.D. (2019, April). Student mathematical activity during analogical reasoning in abstract algebra. Texas State University Mathematics Education Seminar. San Marcos, Tx.

Melhuish, K. & **Hicks, M.D.** (2019, February). Abstract algebra students' function-related understanding and activity. Texas State University Mathematics Education Seminar. San Marcos, Tx.

Hicks, M.D. & Melhuish, K. (2018, November). Student understanding of the general binary operation concept. Texas State University Mathematics Education Seminar. San Marcos, Tx.

TEACHING EXPERIENCE

Postdoctoral Associate, Virginia Tech, Fall 2021-Present
> Department of Mathematics
> - Introduction to Multivariable Calculus (MATH 2204), Fall 2021, **Instructor of Record**

Doctoral Teaching Assistant, Texas State University, Spring 2016-Present
> Department of Mathematics
> - *Calculus I, Honors Calculus I* (MATH 2471), Spring 2016-Fall 2017, Lab instructor
> - *Intermediate Algebra* (MATH 1311, developmental mathematics course), Spring 2017, Lab instructor
> - *Mathematics for Business and Economics I* (MATH 1319), Fall 2017, **Instructor of Record**
> - *Modern Algebra* (MATH 4307), Spring & Fall 2020, Spring 2021. Teaching Assistant
>
>   My duties as TA included observing and assisting students as appropriate with course content, especially during small group work, occasional lecturing, and holding lab sessions to supplement the course.

Master Teacher, Mathworks at Texas State University, June 2017, June 2018
> Junior Summer Math Camp
> - *Logic, Algebra, Number Theory and Geometry,* June 2017
> - *Combinatorics,* June 2018
>
> Co-taught 2-week courses alongside another Master Teacher and acted as a mentor for pre-service middle/high school mathematics teachers and in-service middle/high school mathematics teachers who were observing the camp as part of professional development.

SERVICE

- Member, The Graduate Student Welcome Committee, Spring 2020 - Present.
- Organizer, Graduate Research and Dissertation (GRAD) Seminar, Fall 2019.
- Reviewer, North American Chapter of the International Group for the Psychology of Mathematics Education, 2018-2019
- Reviewer, SIGMAA on RUME, 2018-2019

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- American Mathematical Society, 2016-present
- National Council of Teachers of Mathematics, 2017–present
- North American Chapter of the International Group for the Psychology of Mathematics Education, 2018–present

HONORS AND AWARDS

- Doctoral Research Support Fellowship, Graduate College (2019, $4997)
- Award for Excellence in Research: Graduate Level, Department Award (2020)
- Graduate Student Outstanding Achievement, Department Award (2019)
- Ross & Sarah Wayment Scholar, Department Award (2019)
- Recognition for Academic Excellence at the Doctoral Level, Department Award (2019, 2020)
- Certificate for outstanding contribution as a Master Teacher during the Texas Mathworks Junior Summer Math Camp (June 2017, June 2018)

PROFESSIONAL REFERENCES

Kathleen Melhuish
Texas State University
San Marcos, TX 78666
kmm335@txstate.edu
https://www.math.txstate.edu/about/people/faculty/melhuish.html

Kathleen Melhuish is my primary advisor and co-chair on my dissertation. She is also a mentor for research related to *Orchestrating Discussions Around Proof (ODAP)*.

Jessica Pierson Bishop
Texas State University
San Marcos, TX 78666
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https://www.math.txstate.edu/about/people/faculty/bishop.html

Jessica Bishop is co-chair on my dissertation, as well as a mentor for research related to *Characterizing Critical Aspects of Mathematics Classroom Discourse (CCAMCD)*.

Max Warshauer
Texas State University
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Max Warshauer was my teaching mentor while I was a Doctoral Teaching Assistant, as well as my supervisor during my time working for Mathworks.