

Erik S Tillema

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Indiana University Bloomington
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EDUCATION

- 2007 University of Georgia, Athens, Georgia
Degree: Ph.D., Mathematics Education
Dissertation Title: Students' Algebraic Symbol Systems
Dissertation Advisor: Leslie P. Steffe
- 2003 University of Georgia, Athens, Georgia
Degree: MEd. Mathematics Education 2003
- 2001 University of Wisconsin, Madison, Wisconsin
Course work in Mathematics
- 1999 Earlham College, Richmond, Indiana
Degree: B.A., History,
Minor: Mathematics
- 1998 University of Aberdeen, Aberdeen, Scotland
Course work in European History

ACADEMIC APPOINTMENTS

- 2018-present Indiana University Bloomington
Associate Professor Mathematics Education
- 2015-2018 Chair, Teacher Education Programs Indiana University Purdue University
Indianapolis
- 2014-2018 Indiana University Purdue University Indianapolis (IUPUI)
Associate Professor Mathematics Education
- 2008-2018 Faculty Fellow, Urban Center for the Advancement of Science, Technology,
Engineering, and Mathematics Education
- 2007-2014 Indiana University Purdue University Indianapolis (IUPUI)
Assistant Professor Mathematics Education

OTHER APPOINTMENTS AND PROFESSIONAL CONSULTANTSHIPS

K-12 Mathematics Teaching

- 2002-2003 Clarke Middle School. Athens, GA.

- 2001-2002 Diversity in Mathematics Education (DIME) Program at University of Wisconsin, Madison, WI.
1999-2001 Dane County Transition School. Madison, WI.
2001 University of Wisconsin Summer Enrichment Program, Madison, WI.
1998 University of Wisconsin Summer Enrichment Program, Madison, WI.

PROFESSIONAL ORGANIZATIONS

- 2014-present TODOS: Equity and Excellence in Mathematics Education
Member
2011-present Hoosier Association of Mathematics Teacher Educators.
University Representative
2004-present American Educational Research Association.
Member, SIG-Research in Mathematics Education
2004-present Psychology of Mathematics Education North American Chapter (PME-NA).
Member, Working Group in Quantitative Reasoning and Mathematical Modeling
2003-present National Council of Teachers of Mathematics.

HONORS AND AWARDS

Teaching

- 2014 Outstanding Educator Award, IUPUI
2011 Favorite Professor Award, IUPUI
2009 Favorite Professor Award, IUPUI
2007 Favorite Professor Award, IUPUI

Research

- 2002 University-Wide Fellowship, University of Georgia

PUBLICATIONS AND MANUSCRIPTS

Peer Reviewed Research Publications

Tillema, E.S. & Lockwood, E.L., (draft). Students' listing activity as a way to promote reflective abstraction. *For the Learning of Mathematics*.

Ellis, A.E., Lockwood, E.L., **Tillema, E.S.**, & Moore, K.V. (submitted). A framework for students' generalizing activity. *Journal for Research in Mathematics Education*.

Tillema, E.S. (resubmitted). Students' solution of arrangement problems and their connection to non-linear meanings of multiplication. *Mathematical Thinking and Learning*.

- Tillema, E.S.** (in press). An investigation of 6th graders' solutions of combinatorics problems and representation of these problems using arrays. *Journal of Mathematical Behavior*.
- Tillema, E.S.** (2016). Investigating teaching from a constructivist stance: A model of communication. *Constructivist Foundations*, 12(1), 412-414.
- Tillema, E.S.** & Gatzka, A. (2016). A quantitative and combinatorial approach to non-linear meanings of multiplication. *For the Learning of Mathematics*, 36(2), 26-33.
- Tillema, E.S.** (2014). Students' coordination of lower and higher dimensional units in the context of evaluating sums of consecutive whole numbers. *Journal of Mathematical Behavior*, 36, 51-72.
- Ulrich, K., **Tillema, E.S.**, Hackenberg, A.J., Norton, A.N. (2014). Units coordination: An example of the utility of radical constructivist thought in education. *Constructivist Foundations*, 9(3), 328-339.
- Tillema, E.S.**, Hackenberg, A.J., Ulrich, K., Norton, A.N. (2014). Interaction a core hypothesis of radical constructivist epistemology. *Constructivist Foundations*, 9(3), 354-357.
- Tillema, E.S.**, (2014). A commentary on examining the role of re-presentation in mathematical problem solving: An application of Ernst von Glasersfeld's conceptual analysis. *Constructivist Foundations*, 9(3), 383-385.
- Tillema, E.S.** (2013). A power meaning of multiplication: Three eighth graders' solutions of Cartesian product problems. *Journal of Mathematical Behavior*, 32, 331-352.
- Tillema, E.S.** & Hackenberg, A.J. (2011). Developing systems of notation as a trace of reasoning. *For the Learning of Mathematics*, 31(3), 29-35.
- Tillema, E.S.** (2010). Functions of symbolizing activity: A discussion. *For the Learning of Mathematics*. 30(1), 2-8.
- Hackenberg, A.J., & **Tillema, E.S.** (2009). Students' fraction composition schemes. *Journal of Mathematical Behavior*, 28(1), 1-18.
- Izsak, A., **Tillema, E. S.**, & Tunc-Pekkan, Z. (2008). Teaching and learning fraction addition on number lines. *Journal for Research in Mathematics Education*, 39(1), 33-62.

Invited Book Chapters and Reports Related to Research

- Izsak, A., **Tillema, E.S.**, Tunc-Pekkan, Z. (2016). Partitioning and iterating when teaching and learning fraction addition. *Lessons Learned from Research: Useful Research on Teaching Important Mathematics to All Students*. NCTM, Reston: VA.

Tillema, E.S. (2014). Students' power meanings of multiplication. In L.P. Steffe, K.C. Moore, L.L. Hatfield & S. Belbase (Eds.), *Epistemic algebraic students: Emerging models of students' algebraic knowing* (pp. 281-302). Laramie: University of Wyoming.

Tillema, E.S. (2012). Relating one- and two-dimensional quantities: Students' multiplicative reasoning in combinatorial and spatial contexts. In Mayes, R. & Hatfield, L. (Eds.), *Quantitative Reasoning and Mathematical Modeling: A Driver for STEM Integrated Education and Teaching in Context* (pp. 113-126). Laramie: University of Wyoming.

Tillema, E.S. (2012). Research on relationships between students' linear and power meanings of multiplication. Brief research report for the Quantitative Reasoning and Mathematical Modeling Conference accessible at http://coe.georgiasouthern.edu/QR/QR_reports.html

Peer Reviewed Research Related Conference Proceedings¹

***5 Tillema, E.S. & Hackenberg, A.J.** (2017). *Three facets of equity in Steffe's research programs*. Invited discussant of plenary at the Thirty Ninth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Indianapolis, IN: HAMTE.

***6 Ellis, A.E., Tillema, E.S., Lockwood, E., & Moore, K.V** (2017). *Generalization across domains: The relating-forming-extending generalization framework*. Research report at the Thirty Ninth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Indianapolis, IN: HAMTE.

7 Tillema, E.S. & Gatza, A.M. (2017). *The processes and products of students' generalizing activity*. Research report at the Thirty Ninth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Indianapolis, IN: HAMTE.

Tillema, E.S. & Gatza, A.M. (2016). *A quantitative approach to establishing cubic identities*. Extended paper presented at the Thirteenth International Congress on Mathematical Education in the Algebra Topic Study Group in Hamburg, Germany.

Tillema, E.S. & Gatza, A.M. (2015). *Students' generalizations in the development of non-linear meanings of multiplication and non-linear growth*. Research report at the Thirty Seventh Annual Meeting of the International Group for Psychology of Mathematics Education in North America, East Lansing, MI: Michigan State University.

Tillema, E.S. (2012). What's the difference between doubling and squaring? A framework for investigating how students develop a meaning for raising quantities to whole number

¹ Dr. Denise Mewborn, professor of mathematics education and department chair at the University of Georgia, has advised that the general convention for paper presentations at the Psychology of Mathematics Education North American Chapter Conference is that they appear twice on a person's curriculum vita—once as a peer reviewed conference proceeding and once as a presentation of the paper. This convention is because a paper is required for acceptance to the conference, and is published as a result of the conference. The same applies to papers written for the International Congress on Mathematical Education.

powers. *Proceedings of the Thirty-fourth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education in North America* (pp. 375-378). Kalamazoo: Western Michigan University.

Tillema, E.S. (2011). Students' combinatorial reasoning: The multiplication of binomials. In Wiest, L.R. & Lamberg, T. (Eds.), *Proceedings of the Thirty-third Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education in North America* (pp. 321-328). Reno: University of Nevada.

Tillema, E.S. (2010). The development of notational systems: A creative endeavor. In P. Brosnan, Erchick, D.B., & Flevares, L. (Eds.), *Proceedings of the Thirty-second Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education in North America* (vol. 6, pp. 798-806). Columbus: Ohio State University.

Hackenberg, A. J., & **Tillema, E. S.** (2004). Quantitative schemes as a basis for algebraic reasoning and teaching practices. In D. McDougal (Ed.), *Proceedings of the Twenty-sixth Annual Meeting of the International Group for the Psychology of Mathematics Education* (pp. 302-303). Toronto: OISE/UT.

Peer Reviewed Teaching Publications

Tillema, E.S., & Speranzo, L. (in press). Designing for voice, agency, and empowerment in the middle school classroom. *Mathematics Teaching in the Middle School*.

Tillema, E.S., & Gatza, A. (2017). A problem based approach to the Cartesian coordinate system. *Indiana Mathematics Teacher*, summer 2017, 8-13.

Tillema, E.S., Gatza, A., Ulrich, C. (2017). What's in the Cards?: Integers and Integer Addition for Algebra. *Australian Mathematics Teacher*, 73 (4), 21-29.

Tillema, E.S. (2012). What's the difference?: Using contextualized problems. *Mathematics Teaching in the Middle School*, 17(8), 472-478.

Tillema, E.S. (2009). Cultivating an area model: A rich understanding of multiplying binomials can be developed by working on a series of concrete problems. *Mathematics Teaching in the Middle School* 15(3), 143-147.

Tillema, E. S. (2005). Chinese algebra: Using historical problems to think about current curricula. *Mathematics Teacher* 99(4), 238-245.

Invited Book Chapters Related to Teaching

Tillema, E.S., McClintock, E., Heid, M.K., & Johnson, H. (2015). Properties of i and other complex numbers. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for*

secondary teaching: A framework and classroom based situations (Ch. 14). Information Age Publishing, Charlotte: NC.

Tillema, E.S., Donaldson, S., Edenfield, K., Wilson, J., Murray, E. & Blume, G. (2015). Exponent rules. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 16). Information Age Publishing, Charlotte: NC.

Shimizu, J., Boone, T., Lunt, J., Fratto, C., **Tillema, E.S.**, Kilpatrick, J., Donaldson, S., Fox, R., Johnson, H., Grady, M., Konnova, M. & Heid, M.K. (2015). Multiplying monomials and binomials. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 19). Information Age Publishing, Charlotte: NC.

Hembree, D., **Tillema, E.S.**, McClintock, E., Zbiek, R.M., Johnson, H. Wilson, P., Wilson, J. & Fox, R. (2015). Simultaneous equations. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 24). Information Age Publishing, Charlotte: NC.

Tillema, E.S., Johnson, H., O'Kelley, S.K., Jacobson, E., Blume, G., Heid, M.K. (2015). Connecting factoring to the quadratic formula. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 28). Information Age Publishing, Charlotte: NC.

Tillema, E.S., Cannon, T., Johnson, K., & Zbiek, R.M. (2015). Area of plane figures. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 36). Information Age Publishing, Charlotte: NC.

McClintock E., Peters, S., Kinol, D., Reed, S. Johnson, H., **Tillema, E.S.**, Zbiek, R.M., Heid, M.K., Donaldson, S., Murray, E. & Blume, G. (2015). Similarity. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 38). Information Age Publishing, Charlotte: NC.

Tillema, E.S., Kilpatrick, J., Johnson, H., Grady, M. Konnova, S. & Heid, M.K. (2015). Proof by mathematical induction. In M.K. Heid and P. Wilson (Eds.) *Mathematical understanding for secondary teaching: A framework and classroom based situations* (Ch. 49). Information Age Publishing, Charlotte: NC.

Non-Peer Reviewed Service Publications

Tillema, E.S. (2017). Will state superintendent of public education stand up for public education in Indiana? *Indianapolis Star*, Opinion Editorial.

Tillema, E.S. & Dillon, F. (2013). There are 10_2 kinds of people. *Mathematics Teaching in the Middle School*, 18(9), 584.

- Dillon F. & **Tillema, E.S.** (2013). For whom the toll charges. *Mathematics Teaching in the Middle School*, 18(6), 392.
- Tillema, E.S.** & Dillon, F. (2012). Ship it! *Mathematics Teaching in the Middle School*. 18(5). 320.
- Tillema, E.S.** & Dillon, F. (2012). Canine care. *Mathematics Teaching in the Middle School*. 18(3), 192.
- Tillema, E.S.** & Dillon, F. (2012). What drives fuel economy? *Mathematics Teaching in the Middle School*. 17(9), 576.
- Tillema, E.S.** & Dillon, F. (2012). The caterer's dilemma. *Mathematics Teaching in the Middle School*, 17(8). 512.
- Dillon, F. & **Tillema, E.S.** (2012). The scoop on ice cream. *Mathematics Teaching in the Middle School*. 17(6). 384.
- Dillon, F. & **Tillema, E.S.** (2011). Choose my plate! *Mathematics Teaching in the Middle School*. 17(4), 256.
- Tillema, E.S.** & Dillon, F. (2011). Accurate lab readings. *Mathematics Teaching in the Middle School*. 16(6), 384.
- Dillon, F. & **Tillema, E.S.** (2010). Which coupon code would you use? *Mathematics Teaching in the Middle School*, 16(5), 312.
- Dillon, F. & **Tillema, E.S.** (2010). Knitting patterns. *Mathematics Teaching in the Middle School*, 15(9), 560.
- Tillema, E.S.** (2010). Woodworking and circular windows. *Mathematics Teaching in the Middle School*, 15(8), 496.
- Dillon, F. & **Tillema, E.S.** (2010). A speck of dust. *Mathematics Teaching in the Middle School*, 15(6), 368.
- Dillon, F. & **Tillema, E.S.** (2009). A three-girl family. *Mathematics Teaching in the Middle School*, 15(5). 304.

RESEARCH PRESENTATIONS

National Peer Reviewed Presentations

- ***A Tillema, E.S.** & Hackenberg, A.J. (2017). *Three facets of equity in Steffe's research programs*. Invited discussant of plenary at the Thirty Ninth Annual Meeting of the

International Group for Psychology of Mathematics Education in North America,
Indianapolis, IN: HAMTE.

***B** Ellis, A.E., **Tillema, E.S.**, Lockwood, E., & Moore, K.V (2017). *Generalization across domains: The relating-forming-extending generalization framework*. Research report at the Thirty Ninth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Indianapolis, IN: HAMTE.

***C** **Tillema, E.S.** & Gatza, A.M. (2017). *The processes and products of students' generalizing activity*. Research report at the Thirty Ninth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Indianapolis, IN: HAMTE.

Tillema, E.S. & Gatza, A. (2016). *A quantitative approach to establishing cubic identities*. Research report at International Congress on Mathematical Education in Hamburg, Germany.

Gatza, A. & **Tillema E.S.** (2016). *Interrupting the dominant discourse: Seeing children's mathematics and interrogating manifestations of whiteness and colorblindness*. Presentation at TODOS conference in Phoenix, AZ.

Tillema, E.S. & Gatza, A. (2016). *Investigating math learning, racial identity, and mathematical identity: An emergent theoretical framework*. Discussion session at the National Council of Teachers of Mathematics (NCTM) research pre-session in San Francisco, CA.

Ellis, A.E., Lockwood, E., Moore, K.V, & **Tillema, E.S.** (2016). *What is source material for generalizations about cubics?* Research Symposium at the National Council of Teachers of Mathematics (NCTM) research pre-session in San Francisco, CA.

Tillema, E.S. & Gatza, A.M. (2015). *Students' generalizations in the development of non-linear meanings of multiplication and non-linear growth*. Research report at the Thirty Seventh Annual Meeting of the International Group for Psychology of Mathematics Education in North America, East Lansing, MI: Michigan State University.

Gatza, A.M. & **Tillema, E.S.** (2015). *Racial identity and mathematics learning and participation with middle grades students*. Poster presentation at the Thirty Seventh Annual Meeting of the International Group for Psychology of Mathematics Education in North America, East Lansing, MI: Michigan State University.

Gatza, A.M. & **Tillema, E.S.** (2015). *Re-Conceptualizing Mathematics Research and Curricula: Equity as More than Six Letters with No Traction*. Presentation at the Bergamo Conference on Curriculum Theorizing in Dayton, OH.

Tillema, E.S. (2015). *Elaborating models of students' spatial-multiplicative reasoning: An investigation of 6th graders' solutions of combinatorics problems*. Paper presentation at the American Educational Research Association conference in Chicago, IL.

- Gatza, A.M. & **Tillema, E.S.** (2014). *Models of students' cognition: Re-Thinking mathematics through an equity-based research lens*. Presentation at the Bergamo Conference on Curriculum Theorizing in Dayton, OH.
- Tillema, E.S.** (2013, November). *Quantitative reasoning: The case of quadratic functions*. Presentation for the Quantitative Reasoning and Mathematical Modeling Working Group at the Thirty Fifth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Chicago, IL: University of Illinois Chicago.
- Tillema, E.S.** (2013, June). *Advancing students' multiplicative reasoning as a means to foster their algebraic reasoning*. Invited presentation at the Epistemic Algebraic Student Conference in Athens, GA.
- Johnson, H., Moore, K. Castillo, C., & **Tillema, E.S.** (2013, April). *Reasoning with discrete and continuous images of quantity: Emerging research*. Discussion session at the National Council of Teachers of Mathematics (NCTM) research pre-session in Denver, CO.
- Tillema, E.S.** (2013, April). *A framework for students' non-linear multiplicative reasoning*. Paper presentation at American Educational Research Association (AERA) conference in San Francisco, CA.
- Tillema, E.S.** (2012, October). *What's the difference between doubling and squaring? A framework for investigating how students develop a meaning for raising quantities to whole number powers*. Paper presented for the Thirty-Fourth Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Kalamazoo, Michigan: Western Michigan University.
- Smith, J.P., Confrey, J., Devlin, K., Dougherty, B. & **Tillema, E.S.** (2012, April). *Repeated addition has limits: New foundations for understanding multiplication*. Research Symposium at the National Council of Teachers of Mathematics (NCTM) research pre-session in Philadelphia, PA.
- Tillema, E.S.** (2011, October). *Students' combinatorial reasoning: The multiplication of binomials*. Paper presented for the Thirty-Third Annual Meeting of the International Group for Psychology of Mathematics Education in North America, Reno, Nevada: University of Nevada—Reno.
- Tillema, E.S.** (2011, April). *Expanding models of students' combinatorial reasoning*. Poster session presented at the National Council of Teachers of Mathematics (NCTM) research pre-session in Indianapolis, IN.
- Tillema, E.S.** (2010, October). *The development of notational Systems: A creative endeavor*. Paper presented for the Thirty-Second Annual Meeting of the International Group for the Psychology of Mathematics Education in North America, Columbus: Ohio State University.

- Tillema, E.S.** (2010, April). *A theoretical framework for eighth graders' combinatorial reasoning*. Paper presentation at the National Council of Teachers of Mathematics (NCTM) research pre-session in San Diego, CA.
- Tillema, E.S.**, Ellis, A.B., Lobato, J. & Hohensee C. (2009, April). *Eighth graders' use of quantitative reasoning to generate quadratic functions*. Research symposium at the National Council of Teachers of Mathematics (NCTM) research pre-session in Washington, D.C.
- Tillema, E.S.** (2009, April). *Functions of students' symbolizing activity*. Paper presentation at American Educational Research Association (AERA) conference in San Diego, CA.
- Tillema, E. S.**, Hackenberg, A. J., & Steffe, L. P. (2007, March). *Students' construction of a multiplicative algebra*. Research symposium at the National Council of Teachers of Mathematics (NCTM) research pre-session in Atlanta, GA.
- Rhodes, G. A., Ricks, T. E., Hembree, D., & **Tillema, E. S.** (2006, April). *Examining mentor teachers' deprivatization in school communities*. Working session at the National Council of Teachers of Mathematics (NCTM) research pre-session in St. Louis, MO.
- Hackenberg, A. J., & **Tillema, E.S.** (2005, April). *Constructive resources for algebraic reasoning: Middle school students' construction of fraction composition schemes*. Paper presented at the American Educational Research Association (AERA) conference in Montreal, QC.
- Hackenberg, A. J., & **Tillema, E. S.** (2004, October). *Quantitative schemes as a basis for algebraic reasoning and teaching practices*. Paper presented at the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA) conference in Toronto, ON.
- Izsák, A., **Tillema, E. S.**, & Tunç-Pekkan, Z. (2004, April). *Teaching and learning fraction addition on number lines*. Paper presented at the National Council of Teachers of Mathematics (NCTM) research pre-session in Philadelphia, PA.

Regional

- Gatza, A.M. & **Tillema, E.S.** (2016). *Investigating Mathematical Learning, Race, and Identity with Middle Grade Students: An Emergent Theoretical Framework*. Presentation at the Indiana Mathematics Education Research Symposium, Indianapolis, IN.
- Tillema, E.S.** & Gatza, A.M. (2015). *Students' generalizations in the development of non-linear meanings of multiplication and growth*. Presentation at the Indiana Mathematics Education Research Symposium, Indianapolis, IN.
- Gatza, A.M. & **Tillema, E.S.** (2015). *Exploring the impact of racial identity in interviews on*

mathematical generalizations. Presentation at the Indiana Mathematics Education Research Symposium, Indianapolis, IN.

Local

Tillema, E.S. & Gatzka, A.M. (2015). *Exploring racial identity and mathematical learning and participation*. Presentation at IUPUI's Center for Urban and Multicultural Education.

Tillema, E.S. (2012, January). *Developing a power meaning of multiplication with urban students*. Presentation at IUPUI's Center for Urban and Multicultural Education.

Mockler, S.M. & Tillema, E.S. (2011, July). *Middle grade students' reason about Cartesian product problems*. Presentation at IUPUI's undergraduate research opportunities program conference.

Tillema, E.S. (2011, April). *Integrating urban and cognitive perspectives in mathematics education*. Presentation at IUPUI School of Education's faculty meeting.

Tillema, E.S., Mockler, S.M., Tan, P. (2011, April). *Urban sixth graders reason about combinatorics problems*. Presentation at IUPUI's annual research day.

Tillema, E.S. & Mockler, S.M. (2010, December). *Mathematical cognition: An introduction*. Presentation for Dr. Kathy Johnson's IUPUI capstone course for undergraduates in psychology.

Tillema, E.S. (2010, February). *Students' fraction composition schemes*. Presentation for IUPUI's Urban Center for STEM Education.

INVITED AND PEER REVIEWED TEACHING PRESENTATIONS

Regional

Gatzka, A., & Tillema, E.S. (2015, November). *Integers and Integer Operations: Playing your cards right for algebra*. Presentation at the National Council of Teachers of Mathematics (NCTM) regional conference in Minneapolis, MN.

Tillema, E.S., Gatzka, A., Chandler, B. (2014, November). *Preparing Teachers for Common Core Using Video of Student Reasoning*. Presentation at the National Council of Teachers of Mathematics (NCTM) regional conference in Indianapolis, IN.

Tillema, E.S. (2013, November). *Differentiating instruction for fraction division*. Invited presentation at the National Council of Teachers of Mathematics (NCTM) regional conference in Louisville, KY.

Tillema, E.S. (2012, April). *Transition from graduate school to a faculty position: Developing as a researcher*. Invited presentation at the Indiana Mathematics Education Symposium.

Local

Tan, P., Mockler, S.M., **Tillema, E.S.** (2011, February). *The intentional use of video and interactions as teaching tools*. Presentation at EC Moore Symposium on Excellence in Teaching.

Tillema, E.S. (2008, June). *Reasoning with Oriented Quantities*. Invited workshop presented to the IU Mathematics Education summer training program for Korean teachers. A grant received through the South Korea's Seoul Metropolitan Office of Education.

RESEARCH GRANTS

Active

*2014-present *Generalization Across Multiple Mathematical Areas*. National Science Foundation. PI, Amy Ellis. Co-PIs, Elise Lockwood, Erik Tillema, Eric Weber. \$1,500,000. **(funded)**.

2012-2014 *Investigating the Connection between Students' Spatial-Multiplicative Reasoning and their Algebraic Reasoning Using a Collaborative Model for Research with Urban Schools*. IU's Research Proposal Incentive Fund. PI, Erik Tillema. Percent Contribution: 100%. \$5,000. **(funded)**.

Under Review

*2017 *Supporting Teachers to Promote Students' Mathematical Generalization*. IU's Proffitt Grant. PI, Erik Tillema. Percent Contribution: 100%. \$19,000. **(under review)**.

Completed

2010-2011 *Investigating 6th Grade Students' Understanding of Multi-Digit Multiplication Using Combinatorics Problems*. IUPUI's Research Support Funds Grant. PI, Erik Tillema. Percent Contribution: 100%. \$30,000. **(funded)**.

2010-2011 *Integrating Cognitive and Urban Perspectives in Mathematics Education*. IUPUI's School of Education Internal Grant Competition. PI, Erik Tillema. Percent Contribution: 100%. \$5000. **(funded)**.

2008 *Investigating a Quantitative Approach to the Construction of Algebraic Symbol Systems*. Proffitt Summer Faculty Fellowship. PI, Erik Tillema. Percent Contribution: 100%. \$10,000. **(funded)**.

Submitted but not Funded

- 2013 National Science Foundation. *Anchoring Curriculum and Teaching on Children's Knowledge*. PI, Anderson Norton. Co-PIs, Heather Johnson, Amy Hackenberg, Erik Tillema, Ron Tzur, Jay Wilkins. \$2,000,000. **(declined)**.
- 2012 National Science Foundation. *Anchoring Curriculum and Teaching on Children's Knowledge*. PI, Anderson Norton. Co-PIs, Heather Johnson, Amy Hackenberg, Erik Tillema, Ron Tzur, Jay Wilkins. Percent Contribution: 15%. \$2,000,000. **(declined)**.
- 2012 National Science Foundation. *Anchoring Curriculum and Teaching on Children's Fraction Knowledge*. PI, Anderson Norton. Co-PIs, Amy Hackenberg, Jay Wilkins, Erik Tillema, Ron Tzur, Heather Godino. Percent contribution: 15% \$2,000,000. **(declined)**.
- 2009 IUPUI's Research Support Funds Grant. *Investigating 6th Grade Students' Understanding of Multi-Digit Multiplication Using Combinatorics Problems*. PI, Erik Tillema. Percent contribution: 100%. \$27,000. **(declined, resubmitted and funded)**.
- 2009 National Science Foundation. *Investigating Students' and Prospective Elementary Teachers' First and Second Order Knowledge*. PI, Erik Tillema. Co-PIs, Amy Hackenberg, Signe Kastberg, Dionne Cross. Percent contribution: 32.5%. \$450,000. **(declined)**.

SERVICE GRANTS

- 2009 IU's Office of Alumni Relations. *Symposium on Urban Education*. PI, Erik Tillema. Percent Contribution: 100%. \$400. **(funded)**.
- 2009 IUPUI's Office of Diversity, Equity, and Inclusion. *Symposium on Urban Education*. PI Natasha Flowers Co-PI Erik Tillema. Percent Contribution: 50%. \$800. **(funded)**.
- 2009 IUPUI's Academic Affairs Conference Fund, *Symposium on Urban Education*. PI, Erik Tillema. Percent Contribution: 100%. \$1,500. **(funded)**.
- 2009 IUPUI's Fortieth Fund, *Symposium on Urban Education*. PI, Erik Tillema. Percent Contribution: 100%. \$2,000. **(funded)**.

UNIVERSITY COURSES TAUGHT OR ASSISTED

Graduate Courses

Seminar in Mathematics Education: History and Curriculum in Mathematics Education (N716), 3-credits, Over the past 100 years, the USA and many other countries worldwide have

experienced repeated attempts to reform the school mathematics curriculum. The focus of our reading and discussions this semester will be the changing school mathematics curriculum and the issues and forces that have influenced these changes. The first half of the course will be devoted to the history of mathematics curriculum development in the United States. We will compare and contrast different curricula from 1900-1990 and examine some primary source documents about the history of education in this country. The second half of the course will be devoted to contemporary curriculum development projects (1990s and newer). Throughout we will examine the history of curriculum development using a critical perspective asking questions like: Who does a particular curriculum development project serve?; How do particular curriculum development projects influence outcomes in schools?; and What power relations are preserved or not as a result of decisions embedded in particular curriculum development projects?

Seminar in Mathematics Education: Research on Learning (N716), 3-credits, The focus of this course is to help doctoral candidates develop an understanding of research in mathematics education through a focused reading of research on students' multiplicative reasoning. The reason for this choice of topic is: (1) it has been an important area of research in mathematics education that cuts across many content domains and age ranges; and (2) it is closely connected to issues of curriculum and learning. The course is organized so that we will begin by reading about multiplicative reasoning with whole numbers, then move to more advanced topics like the multiplicative reasoning involved in fraction reasoning, ratio reasoning, proportional reasoning, and reasoning with linear functions. We will close the course with readings on non-linear multiplicative reasoning (e.g., raising numbers to a whole number power, and exponential reasoning).

Research in Mathematics Education (E590), The focus of this course is to support masters or PhD. students to do a research project in mathematics education. The research projects that I have facilitated have included: (1) an investigation of whether elementary grade students with autisms increased their communicative acts when using assistive technology to engage with mathematics problems. This work resulted in a graduate student submitting a manuscript that he is currently revising to *Autism and Other Developmental Disabilities*; (2) an investigation of a kindergartner's early number concepts; and (3) an examination of the impacts of team teaching and technology use for special education elementary students' understanding of mathematics.

Master Project Practicum (J538), This is the final course masters students take before completing their degree, and it entails them in writing a masters project or thesis.

Undergraduate Courses

**Teach and Learn Elementary Mathematics I* (N102), 3 credits, This course uses elementary grades students' quantitative reasoning with whole numbers as a basis for helping pre-service elementary grades teachers reflect on, and develop their own quantitative reasoning with whole numbers. I have developed a curriculum that uses the Cognitively Guided Instruction videos, Math Solutions videos, and videos from my own research to show pre-service teachers elementary grades students' strategies for reasoning about whole numbers. Then they use these strategies to work on problem sets that I have developed, which involve problems in base five

and base twelve. The course is structured around helping the pre-service teachers understand how students' progress over time in their whole number reasoning.

Teach and Learn Elementary Mathematics II (N103), 3 credits, This course uses elementary grades students' quantitative reasoning with fractions, decimals, and percents as a basis for helping pre-service elementary grades teachers reflect on, and develop their own quantitative reasoning with fractions, decimals, and percents. I have developed a curriculum that uses videos from my own research to show pre-service teachers students' strategies for reasoning about fractions, decimals, and percents. Then they use these strategies, along with the computer micro-world JavaBars, to work on problem sets that I have developed. The course is structured around helping the pre-service teachers understand how students progress in their reasoning with fractions, decimals, and percents.

Mathematics in the Elementary School (N343), This course is a 6-credit course that combines the contents of N-102 and N-103.

Mathematics Methods for Elementary Teachers: Grades K-2 (E345), 3.5 credits, This course has a field component—students interact one on one with a kindergarten student three times and one on one with a first grade student three times—and a non-field component—students attend regular course meetings for fifteen-weeks. The course has three main strands: using different aspects of how students develop an early understanding of number, developing teacher identity that includes an understanding of teachers and schools as racialized people/spaces, and identifying discourse moves in order to connect them to the creation of equitable classrooms. Throughout the course, I used video to prepare students for field experiences, and then use their field experiences to connect to our discussions and readings in class.

Mathematics Methods for Elementary Teachers: Grades 3-6 (E343), 3.5 credits, This course has a field component—students interact with a small group of elementary students for six to eight weeks—and a non-field component—students attend regular course meetings for fifteen-weeks. The course has three main strands: using students' reasoning about multiplication, division, and fractions as a basis for designing interactions with a small group of elementary grades students, identifying and using appropriate discourse moves for facilitating small group interactions, and analyzing the structure of teachers' lessons. Throughout the course, I use video to prepare students for their field experience, and then I use their field experience as a way for them to document how they are using what they have learned in the course in their interactions with students.

Course Enrollments for IUPUI courses

Year	Semester	Course Number & Credit Hours	Enrollment
2007-2008	Fall	E343, 3 credits	27
	Fall	E343, 3 credits	26
	Spring	E343, 3 credits	26
2008-2009	Fall	N102, 3 credits	27

	Fall	N103, 3 credits	27
2009-2010	Fall	N102, 3 credits	30
	Fall	N103, 3 credits	30
	Fall	E590, 3 credits	1
	Spring	N343, 6 credits	25
2010-2011	Fall	N343, 6 credits	28
	Spring	N102, 3 credits	23
	Spring	N590, 5 credits	1
	Summer	J538, 6 credits	1
	Summer	E590, 3 credits	1
2011-2012	Fall	N102, 3 credits	24
	Fall	N102, 3 credits	20
	Spring	N102, 3 credits	27
	Spring	N102, 3 credits	28
	Spring	N102, 3 credits	1
2012-2013	Fall	N102, 3 credits	24
	Fall	N102, 3 credits	20
	Spring	N102, 3 credits	28
	Spring	N102, 3 credits	27
2013-2014	Fall	N102, 3 credits	24
	Fall	N716, 3 credits	6
	Fall	N590, 3 credits	1
	Spring	N102, 3 credits	24
	Spring	N102, 3 credits	26
2014-2015	Fall	N102	25
	Fall	N102	24
	Spring	E345	27
	Spring	Course Buyout	NSF Grant
2015-2016	Fall	N716	9
	Fall	N610	2
	Fall	N590	1
	Fall	Course Release	Chair Teacher Ed.
	Spring	Sabbatical	
*2016-2017	Fall	Course Release	Chair Teacher Ed.
	Fall	Course Buyout	Grant
	Spring	Course Release	Chair Teacher Ed.
	Spring	Course Buyout	Grant
*2017-2018	Fall	Course Release	Chair Teacher Ed.
	Fall	N102	24
	Spring	Course Release	Chair Teacher Ed.

	Spring	E543	10
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Mean Teaching Evaluation Scores for all IUPUI Courses on 6 Common Survey Items (1- 5pt. scale)

Survey Item	Average
Overall I would rate the quality of this course as outstanding.	4.32
Overall I would rate the quality of this instructor as outstanding	4.36
My instructor is knowledgeable about course topics.	4.74
The instructor promotes an atmosphere that is conducive to learning.	4.62
I learned a lot in this course/I developed the ability to solve problems in the field.	4.60
My instructor organized the course well.	4.52

ACADEMIC MENTORING AND ADVISING

Faculty Mentor

- *2016-present Teresa Sosa, faculty mentor
- *2016-present Jeremy Price, temporary faculty mentor

Doctoral Program Dissertations, Program Committees, and Independent Studies

- *2017-present Rebecca Borrowski, PhD. student, member dissertation committee
- *2017-present Weverton Attaide, PhD. student, member program committee
- *2016-present Catherine Kaduk, PhD. student, external member dissertation committee, anticipated graduation December, 2017.
- 2016 Ayfer Adeniz, PhD. student, Reader qualifying exams
- 2016 Mike Daiga, PhD. student, Reader qualifying exams
- 2016 Rich Kogen, PhD. student, Supervisor research experience
- 2016 Musa Sadek, PhD. student, Supervisor research experience
- 2015 Robin Jones, PhD. student, Independent study: Internship in mathematics education
- 2015 Courtney Flessner, PhD. student, Independent study: Internship in mathematics education
- 2015 (FA) Andrew Gatza, PhD. student, Independent study: Research in mathematics education
- 2015 (SP) Andrew Gatza, PhD. student, Independent study: Research in mathematics education
- *2014-present Abdul Alhayyan, PhD. student, member program committee, anticipated graduation May, 2019

- *2014-present Ryan Timmons, PhD. student, chair program committee, anticipated graduation May, 2018
- *2013-present Andrew Gatza, PhD. student, chair program committee, anticipated graduation May, 2018
- 2010-2012 Paul Tan, PhD. student, member program committee
- 2011 Paul Tan, PhD. student, research project
- 2009 Sue Ellen Richardson, PhD. student, research project

Adjunct and Associate Instructor Mentorship

- 2018 Ana Luis, adjunct instructor E543
- *2017 Weverton Attaide, associate instructor N-102
- *2017 Kim Johnson, adjunct instructor E343
- *2017-present Karmen Franklin, adjunct instructor N-102
- *2017 John Palmer, adjunct instructor N-102
- 2016-present Betty Wood, adjunct instructor N-102
- 2016 Eric Nunally, adjunct instructor E345
- 2016 Robin Jones, adjunct instructor N-102
- 2015 Michelle Hausler, associate instructor N-102
- 2015 Lauren Rapacki, associate instructor N-102
- 2015 Denice Lewis, adjunct instructor N-102
- 2014-2015 Paul Tan, adjunct instructor N-102
- 2013-2014 Sandra Baker, adjunct instructor N-102
- 2013-2014 Jennifer Jensen, adjunct instructor N-102

Masters Degree Advisor

- 2012 Marguerite Bopp, graduated, Advisor
- 2011 Jordan Perry, graduated, Advisor
- 2011 Lauren Grosse, graduated, Advisor
- 2011 Caitlin Hussey, graduated, Advisor
- 2010 Martha Honor, graduated, Advisor
- 2010 Brooke Morgan, graduated, Advisor
- 2010 Jennifer Windle, graduated, Advisor
- 2010 Hanako Kawamoto, transferred to social work, Advisor
- 2009-2011 Jennifer Mirkovich, degree awarded, Masters Project Director and Advisor

Undergraduate Advising, Research, and Mentorship

- 2015-present Kasha Hayden, independent study for N-102
- 2014-present Brendan Chandler, Mentor for presentation at NCTM regional conference
- 2013-present Lukas Riley, Mentor Undergraduate Research
- 2013 Jillian Evrard, Mentor for Benchmark II indicators
- 2013 William Strong, Mentor
- 2013 Laura Brown, Directed honors project for honors course credit

2012-2013	Brendan Chandler, Mentor for manuscript submission to Mathematics Teaching in the Middle School
2012	Michelle Muldoon, Directed honors project for honors course credit
2012	Brittany Grimm, Mentor for Benchmark II indicators
2011	Scott Horan, Mentor for Benchmark II indicators
2010-2011	Samantha Mockler, Mentor Undergraduate Research Opportunities Program
2010-2011	Jayne Taylor, Mentor Undergraduate Research
2010	Donald Holly, Mentor
2010	Taylor Hall, Mentor for Benchmark II indicators
2010	Sylvia Lane, Mentor for Benchmark II indicators
2010	Miranda Erdman, Mentor for Benchmark II indicators
2010	Erica Von Dielingen, Mentor for Benchmark II indicators
2010	John Higgins, Mentor for Benchmark II indicators
2010	Heather Nadzam, Mentor for Benchmark II indicators
2010	Erin Jackson, Mentor for Benchmark II indicators
2010	Deborah Herzner, Mentor for Benchmark II indicators
2010	Alyssa Miller, Mentor for Benchmark II indicators
2010	Abigail Fritch, Mentor for Benchmark II indicators
2010	Clay Calvert, Mentor for Benchmark II indicators
2010	Kristine Morrison, Mentor for Benchmark II indicators
2010	Dan Jenkins, Mentor for Benchmark II indicators
2010	Courtney Henson, Mentor to become a Teaching Assistant
2009	Marcella Burrow, Mentor for Benchmark II indicators
2009	Mary Beth Hadler, Mentor for Benchmark II indicators
2009	Erik Felts, Mentor for Benchmark II indicators
2009	Marissa Wilson, Mentor for Benchmark II indicators
2009-2010	Emily Bingham, Mentor for manuscript submission to Teaching Children Mathematics
2008	Carol Austin, Mentor for Benchmark II indicators
2008	Suzanne Arnold, Mentor for Benchmark II indicators
2008	Megan Grubaugh, Mentor for Benchmark II indicators
2008	Jennifer Koch, Mentor for Benchmark II indicators

UNIVERSITY SERVICE

School/Department

*2017	Presenter, Craig Willey case for promotion and tenure
*2017	Reviewer, Urban Education doctoral applications
*2015-present	Chair, Teacher education programs IUPUI
*2015-present	Coordinator, Mathematics and Science concentration for elementary pre-service teachers
2015	Member, Policy council graduate studies committee
2015	Member, search committee for visiting faculty member in mathematics education
2015	Member, search committee for web developer
2015	Chair, selection committee for chair of teacher education

- 2015 Member, EAD selection committee
- 2015 Chair, Third year review committee Craig Willey
- *2014-present Reader, Mathematics Education doctoral student portfolios
- 2014-present Co-Chair, IUPUI SOE Faculty Meeting Agenda Committee
- 2014-present Co-Chair, Faculty Co-Chair for IUPUI faculty meetings
- 2014 Author, program option for PhD. students in mathematics education to reside on IUPUI's campus
- 2014 Author, Mathematics and science concentration for elementary pre-service teachers
- 2014 Guest, IUPUI SOE Faculty Affairs and Budgetary Affairs
- 2014 Member, Policy Council Elections Committee
- 2013 Co-author, Appeal to the University Curriculum Advisory Committee about general core
- 2012-2013 Chair, IUPUI School of Education Issues in Urban STEM Speakers Series Committee
- 2012-present Co-Chair, IUPUI School of Education Scholarship Committee
- 2012-2013 Member, IUPUI School of Education Reform Committee
- 2012-2013 Member, IUPUI School of Education Structure and Governance Working Group
- 2010 Author, Appeal to the University Curriculum Advisory Committee about N-102
- *2010-present Member, IUPUI School of Education Council on Teacher Education
- 2010-2011 Member, IUPUI Search Committee tenure track mathematics education faculty
- 2010-2011 Member, IUPUI School of Education Technology Committee
- 2008-2012 Member, IUPUI School of Education Scholarship Committee
- 2008-2009 Member, IUPUI Agenda Committee for Faculty Meetings
- *2007-present Reviewer, IUB mathematics education graduate program applications

Campus

- *2017 Reviewer, CEG grants
- *2017 Reviewer, RSFG grants
- 2014-2015 Member, IUPUI Faculty Council
- 2014-2015 Member, Research subcommittee of IUPUI Faculty council
- 2013 Member, IUPUI's Program Review of the Mathematics Department
- 2012-present Member, IUPUI Strategic Scholarship Coordinating Committee
- 2011 Reviewer, IUPUI Multidisciplinary Undergraduate Research Institute proposals
- 2011 Mentor, IUPUI Undergraduate Research Opportunities Program
- 2010-2012 Member, IUB/IUPUI School of Education Policy Council
- 2010-2011 Chair, IUB/IUPUI School of Education Lectures and Seminars Committee
- 2008-2010 Member, IUB/IUPUI School of Education Lectures and Seminars Committee

PROFESSIONAL SERVICE

Regional

- *2016-2018 Faculty Advisor, Indiana Mathematics Education Research Symposium
- 2015-2016 Co-Organizer, Indiana Mathematics Education Research Symposium

- 2014-2015 Co-Organizer, Indiana Mathematics Education Research Symposium
 2013-2014 Chair, Indiana Mathematics Education Research Symposium
 2012-2013 Co-Organizer, Indiana Mathematics Education Research Symposium
 2012-present Member, Subgroup of Hoosier Association of Mathematics Teacher Educators investigating the possibility of establishing a Elementary Mathematics Specialist Licensure in the State of Indiana
 2011-2012 Co-Organizer, Indiana Mathematics Education Research Symposium
 2011-present Member & University Representative, Hoosier Association of Mathematics Teacher Educators

National

- *2017-present Member Editorial Panel, Mathematics Teaching in the Middle School
 2016 Letter of Recommendation, Job application for Elise Lockwood to UGA
 2015 External Reviewer, Promotion and Tenure Case Heather Johnson
 *2014-present Reviewer, *Indiana Mathematics Teacher*
 2014 Reviewer, *Qualitative Studies in Education*
 2014-2015 Member, Subcommittee to organize the Psychology in Mathematics Education Conference North American Conference in 2016
 2014-2015 Member Program Committee, National Council of Teachers of Mathematics regional conference in Minneapolis, MN.
 2014 External Reviewer, Promotion and Tenure Case Holly Anthony
 2014 Facilitator, National Council of Teachers of Mathematics Common Core Standards Professional Development Institute for Middle Grades Teachers
 2013-2015 Member, Steering Committee for the Psychology in Mathematics Education Conference North America
 2013 Co-Organizer, Quantitative Reasoning and Mathematical Modeling working group at the Psychology in Mathematics Education Conference North America
 2013 Facilitator, National Council of Teachers of Mathematics Common Core Standards Professional Development Institute for Middle Grades Teachers
 2013 Co-Editor, Math for Real section of *Mathematics Teaching in the Middle School*
 *2009-present Reviewer, Psychology in Mathematics Education Annual North American Conference
 2009-2012 Editor, Math for Real section of *Mathematics Teaching in the Middle School*
 2009 Lead Organizer, IUPUI's Symposium on Urban Education.
 2008-2010 Reviewer, American Educational Research Association's Annual Conference
 2008-present Reviewer, National Council of Teacher's of Mathematics Annual Research Pre-session Proposals
 *2008-present Reviewer, *Journal of Research in Mathematics Education*
 *2008-present Reviewer, *Journal of Mathematical Behavior*
 *2007-present Reviewer, *Mathematics Teaching in the Middle School*
 2003-2006 Associate Editor, *The Mathematics Educator*
 2003-2004 Vice President, Mathematics Education Student Association at University of Georgia
 2002-present Reviewer, *The Mathematics Educator*

International

- 2015-present Reviewer, International Congress on Mathematical Education proposal reviewer
2011 Reviewer, Social Science and Humanities Research Council of Canada grant
proposal
*2014-present Reviewer, Psychology in Mathematics Education Conference proposal reviewer
*2011-present Reviewer, *Mathematical Thinking and Learning*
*2009-present Reviewer, *International Journal of Science and Mathematics Education*