
JEFFREY E. BARRETT

Department of Mathematics
Campus Box 4520, Stevenson Hall
Illinois State University
Normal, Illinois 61790-4520

jbarrett@ilstu.edu
(309) 438-7849
<http://math.illinoisstate.edu/jbarrett>

Jeffrey E. Barrett is Professor of Mathematics Education and Associate Director of the Center for Mathematics, Science and Technology at Illinois State University. His primary research interests include: the learning and teaching of the mathematics of measurement, geometric reasoning, the use of computer software to model mathematical ideas, and the professional development of teachers engaged in teaching elementary and middle-school level mathematics or science.

Current Research Projects

Dr. Barrett is currently Principal Investigator of a four-year project, Learning Trajectories to Support the Growth of Measurement Knowledge: Pre-K through Middle School in collaboration with Douglas Clements and Julie Sarama at the University of Denver along with Craig Cullen, a colleague at Illinois State University. See the project website at:

<http://childrensmeasurement.org/>

The Children's Measurement research team (a collaboration of ISU and the University of Denver) recently produced and submitted a video entry in the national video showcase competition organized by the National Science Foundation. The video entry for our team received a Facilitator's Award for 2016; our video was one of 28 videos to be recognized among 156 entries. See the results at:

<http://stemforall2016.videohall.com/presentations#/winners/id=winners>

Prior to 2012, Barrett completed a related four-year project: A Longitudinal Examination of Children's Developing Knowledge of Measurement: Mathematical and Scientific Concept and Strategy Growth from Pre-K to Grade 5 in collaboration with Douglas Clements and Julie Sarama at the University of Denver. Both projects are part of the Discovery Research K-12 Program of the National Science Foundation.

Barrett and members of the Children's Measurement research team from Illinois State University participated in working meetings at a national mini-center for research and development focused on the teaching and learning of measurement. This collaborative research initiative was funded by the National Science Foundation to support and strengthen collaborative discussion among research teams from Michigan State University, Vanderbilt University, University of Missouri, the Ohio State University, North Carolina State University, and the University of Buffalo (SUNY) as well as Illinois State University. Conferences have been held in 2009, 2010 and 2012 at Michigan State

University, with the conference for 2011 hosted by Jeff Barrett at Illinois State University, in cooperation with Doug Clements and Jack Smith. Barrett served as the external auditor and on the advisory board for the NSF funded (DR K-12 program) project entitled, *A Study of the Struggling Learner's Knowledge and Development for Number and Operation* led by John Lannin and Delinda van Garderen of the University of Missouri at Columbia, MO. This three-year project began its funding period on September 1, 2009.

During the period from 1999 to 2003, Barrett co-directed a National Science Foundation funded project for systemic K-5 teacher development entitled, *PRIME Mathematics K-5 Project*, engaging over 300 teachers learning to teach with the *Investigations in Number, Data and Space* curriculum. See Reports on this project at: <http://pdmathsci.net/findings/memos>, a website of Horizon Research, Inc. In 2011-2013, Barrett co-directed a Math Science Partnership project through the Illinois State Board of Education with funding from the U.S. Department of Education, focusing on guiding teachers to improve their professional knowledge of teaching geometric measurement topics in K-5 classrooms, using learning trajectories. Currently, 2015-2017, Barrett is serving as an Intel Math professional development instructor in another MSP project in LaSalle, Illinois to support ISBE program needs.

Overview of education, research and teaching

Dr. Barrett teaches undergraduate and graduate courses at ISU on: geometry, elementary mathematics learning and teaching, and human cognition.

Educational Background Ph. D., State University of New York at Buffalo (1998), Mathematics Education
M.S., State University of New York at Buffalo (1995), Mathematics Education
Full California Teaching Credential (Mathematics K-12), Biola University (1985-86)
B.S., Biola University, La Mirada (1982), Applied Mathematics

Areas of Research I am currently studying children's concepts and strategies for measure and geometry tasks. I investigate processes of coordinating, abstracting, and representing quantity in both number systems and in spatial contexts. I am also interested in understanding the various ways students may gain abstraction by working within a computer microworld (e.g., Geometer's Sketchpad, or GeoGebra software).

I continue to examine ways of characterizing students' increasingly sophisticated notions about substantive mathematical concepts (e.g., linear measurement); learning trajectories are a theoretical account of development and learning that hold promise as adequate characterizations of both detailed descriptions and broad trends that can serve in designing curriculum, building assessment instruments and to inform professional development.

I am exploring and researching ways to understand teachers' improvements in instruction by reflective engagement with mathematical ideas, especially

measurement and geometry concepts (e.g., Lesson Study approaches).

Positions of Employment Held:

<i>Dates</i>	<i>Institution</i>	<i>Title or Rank</i>
2010-present	Illinois State University	Professor
2006-present	Illinois State University	Associate Director of the Center for Math, Science, and Technology (CeMaST)
2004-2010	Illinois State University	Associate Professor
1997-2004	Illinois State University	Assistant Professor
1993-1997	University at Buffalo, SUNY	Research Assistant
1992-1993	Westside Christian School, Yakima, WA	Curriculum Coordinator and Mathematics/Computer Teacher
1991-1992	Zhanziang Medical College, Zhanziang City, China	Lecturer in English (Conversational English as a Foreign Language and Writing)
1989-1991	Westside Christian School, Yakima, WA	Mathematics Teacher (Gr. 7-12)
1987-1989	Victory Christian School, Sacramento, CA	Mathematics Teacher (7-12)
1986, 87, 88 Summers	Davis Unified School District	Computer Technology (7-12)
1986-1987	Davis Unified School District and Dixon Unified Schools (CA)	Substitute teacher grades 3-12
1986	Biola University, La Mirada, CA	Lecturer, College of Arts and Sciences
1982-1986	Hughes Aircraft Company, Fullerton, CA	Computer Programmer/Analyst

Courses Taught at Illinois State University

Since 1997, I have taught a variety of courses including content courses for non-majors, methods courses for undergraduate majors, courses designed for practicing teachers, and graduate courses for Ph.D. or Masters -level students.

Undergraduate-Level Courses:

MAT 130	Dimensions of Mathematical Thinking
MAT 131	Geometric Reasoning: Geometry as Earth Measures
MAT 152	Structure of Number Systems II (Geometry and Algebra)
MAT 201	Teaching Mathematics in the Elementary School (methods)
MAT 202	Math for the K-8 Specialist (Algebra and Rational Numbers)
MAT 204	Geometry for K-8 Teachers
MAT 302	Teaching Mathematics in Grades 5-8 (methods of teaching)

Graduate-Level Courses:

MAT 401	Current Research in School Mathematics
MAT 402	Instructional Strategies for Elem. And Jr. High Mathematics
MAT 403	Theories of Mathematical Learning
MAT 404	Issues and Trends in Mathematics Education

MAT 422	Topics in Geometry for Teachers
MAT 429.09*	Enhancing Middle-School Students' Geometric Reasoning through Computer-Based Technology (Gr. 5-8 Teaching)
MAT 429.10*	Teaching Problem Solving in Grades K-4: Using Extended tasks in Geometry and Measurement
MAT 580	Mathematical Thinking and Learning (Advanced cognitive accounts of learning)
MAT 583	Supervision of Professional Project
MAT 585	Topics in Mathematics Education Seminar: <ul style="list-style-type: none"> • Geometry Learning, Spring, 1999, • Design-Based Methods of Research, Summer, 2003, • Learning Environments, Fall 2006.

Advising Students

Ph.D. Dissertation Co-Director Title <i>Investigating Children's Intuitive and Analytical Thinking About Path Length as a Developmental Phenomenon</i>	Cheryl Eames	2014
Ph.D. Dissertation Co-Director Title <i>Students' Reasoning about Invariance of Volume as a Quantity</i>	Melike Kara	2013
Ph.D. Dissertation Director Title <i>Investigating Conceptual, Procedural, and Intuitive Aspects of Area Measurement with Non-Square Area Units</i>	Amanda Miller	2013
Ph.D. Dissertation Director Title <i>A comparative analysis: Two representational models for units of length</i>	Craig Cullen	2009
Ph.D. Dissertation Director Title <i>Measurement learning trajectories: a tool for professional development</i>	Jenni McCool	2009

* These courses were designed for practicing high school mathematics teachers and delivered as part of the department's Teacher Improvement Program (TIP) administered during summer sessions.

Ph.D. Dissertation Director Title <i>Prompting mathematics teacher development through dynamic discourse</i>	Andrea Knapp	2007
Ph.D. Dissertation Committee Member:	Pamela Beck	2016
	Ted Rupnow	2016
	Megan Wickstrom	2014
Ph.D. Dissertation Co-Director:	Sarah-Jean Pennisi	2004
Ph.D. Dissertation Co-Director:	Paul Yu	2004
Ph.D. Dissertation Committee Member:	Shelley Jones	2002
Ph.D. Dissertation Committee Member:	Jo Clay Olson	2003
Ph.D. Professional Project Director:	Jenna O'Dell	2016
	Pam Beck	2014
	Cheryl Eames	2013
	Melike Kara	2011
	Amanda Miller	2010
	Craig Cullen	2008
	Jenni McCool	2008
	Andrea Knapp	2005
	Jo Clay Olson	2002
	Sarah-Jean Pennisi	2001
	Cheryl Hunt Adeyemi	2000
Ph.D. Professional Project Co-Director:	Paul Yu	2002
Faculty Sponsor,	Jo Olson, Andrea	2001
Graduate Research Symposium:	Knapp	
	Cheryl Hunt	2000
Honors Undergraduate Research (IDS (604) H285) for 3 semester credit hours.	Julie Setterdahl	1999
Faculty Sponsor, In-Class Honor's Projects:		
(MAT 131, Geometric reasoning, measures)	Caitlin Huff	2010
(MAT 204, Geometry for K-8 Teachers):	Jamie Sanders	2003
(MAT 302, Teaching Mathematics, GR. 5-8)	Christie Schertz	1998
(MAT 152, Structure of Number Systems II)	Beth Martin	1997

Experimental Development of Instructional Materials-
Design work for instruction with elementary students:

I have collaborated with the members of the Measurement Mini-Center to contribute learning trajectory descriptions of the curricular levels of length, area and volume measurement to the

[Learning Trajectories Hexagon Map of the Common Core Mathematics Standards](#)

This is an online curriculum and standards support for the Common Core State Standards for Mathematics, at the website:

<http://www.turnonccmath.com/>

In a cross-disciplinary project, Prof. Saad El-Zanati and I collaborated on an experimental course to engage elementary students in substantive tasks and problems from Discrete Mathematics and algebraic reasoning intended to develop the students' connections and integration of diverse contexts calling for generalization. The course also engaged pre-service secondary teaching candidates from the summer research project directed by El-Zanati, Langrall and Barker in research projects focusing on the description of students' capacity and knowledge for generalization of mathematical ideas. This course was two weeks long, for two hours daily from July 7-18, 2008. This was a collaborative project with the College for Youth summer program at the Metcalf School. The course was entitled, *Wild World of Math* (There were 8 elementary students ranging in grade level from 2 to 5.) An outcome of this work was the poster presentation at the Research Pre-session of the National Council of Teachers of Mathematics in April 2009:

Witkowski, C., Barker, D., Langrall, C., Barrett, J., & El-Zanati, S. *The role of representation in elementary level generalization activities.*

Scholarly Contributions to Field

Refereed journals, contributions to national reports, and international proceedings papers.

- Knapp, A. K., Barrett, J. E. and Moore, C. J. (2016). Prompting Teacher Geometric Reasoning through Coaching in a Dynamic Geometry Software Context. *School Science and Mathematics*, 116: 326–337. doi:10.1111/ssm.12184
- Beck, P. S., Eames, C. L., Cullen C. J., Barrett, J. E., Clements, D. H., & Sarama, J. (2014). Linking children’s knowledge of length measurement to their use of double number lines. In Liljedahl, P., Nicol, C., Oesterle, S., & Allan, D. (Eds.). *Proceedings of the 38th Annual Conference of the International Group for the Psychology of Mathematics Education*. (Vol. 2) (pp. 105-112). Vancouver, Canada: PME
- Barrett, J., Clements, D., Sarama, J., Cullen, C., McCool, J., Witkowski, C., & Klanderma, D. (2012). Evaluating and Improving a Learning Trajectory for Linear Measurement in Elementary Grades 2 and 3: A Longitudinal Study. *Mathematical Thinking and Learning*, 14 (1), 28-54.
- Barrett, J., Cullen, C., Sarama, J., Clements, D., Klanderma, D., Miller, A., & Witkowski-Rumsey, C. (2011). Children’s Unit Concepts in Measurement: A Teaching Experiment Spanning Grades 2 through 5. *ZDM: The International Journal on Mathematics Education*, 43 (5), 637-650.
- Sarama, J. Clements, D. H., Barrett, J., VanDine, D. W., and McDonel, J. S. (2011). Evaluation of a Hypothetical Learning Trajectory for Length in the Early Years. *ZDM: The International Journal on Mathematics Education*, 43 (5), 667-680.
- Daro, P., Mosher, F. A., & Corcoran, T. (2011) with: J. Barrett, M. Battista, D. Clements, J. Confrey, V. Daro, A. Maloney, W. Nagakura, M. Petit, and J. Sarama. *Learning Trajectories in Mathematics: A foundation for standards, curriculum, assessment, and instruction*. New York: Teachers College-Columbia University.
- Cullen, C. J., Miller, A. L., Barrett, J. E., Clements, D. H., Sarama, J., (2011). Unit eliciting task structures: Verbal prompts for comparative measures. In Behiye Ubuz (Ed.), *Proceedings of the 35th Annual Conference of the International Group for the Psychology of Mathematics Education*. Ankara, Turkey: International Group for the Psychology of Mathematics Education.
- Cullen, C. J., & Barrett, J. E., (2010) Strategy use indicative of an understanding of units of length. In M. Pinto & T. Kawasaki (Eds.), *Proceedings of the 34th Annual Conference of the International Group for the Psychology of Mathematics Education*. Vol. 2, pp. 281-288. Belo Horizonte, Brazil: International Group for the Psychology of Mathematics Education.

-
- Presmeg, N. C. & Barrett, J. (2009). Lesson study characterized as a multi-tiered teaching experiment. In T. Baba (Research Leader, Graduate School for International Development and Cooperation, Hiroshima University), *International comparative studies on influence of teachers' views about education on mathematics lessons at primary schools*. Report, International Cooperation Project towards the Endogenous Development of Mathematics Education (pp. 304-314). International Research Fund (B) (2), Number 16402045. [This paper is a published version (in English) of a presentation by the first author at Hiroshima University in 2007. Most of the papers in the Report are in Japanese.]
- Yu, P., Barrett, J., & Presmeg, N. (2009). Prototypes and Categorical Reasoning: A Perspective to Explain How Children Learn about Interactive Geometry Objects. In T. V. Craine (Ed.), *Understanding Geometry for a Changing World* (Seventy-first Yearbook of the National Council of Teachers of Mathematics). Reston, VA: NCTM, pp. 109-125.
- Presmeg, N. C., Barrett, J., & McCrone, S. S. (2007). Fostering generalization in connecting registers of dynamic geometry and Euclidean constructions. In J. H. Woo, H. C. Lew, K. S. Park, & D. Y. Seo (Eds.), *Proceedings of the 31st Annual Meeting of the International Group for the Psychology of Mathematics Education*, Vol. 4, pp. 81-88. Seoul, July 8-13, 2007.
- Barrett, J. E., Clements, D. H., Klanderma, D. B., Pennisi, S. J., Polaki, V. (2006). Students' coordination of geometric reasoning and measuring strategies on a fixed perimeter task: Developing mathematical understanding of linear measurement. *Journal for Research in Mathematics Education*, 37(3), 187-221.
- Olson, J. C. & Barrett, J. (2004). Coaching teachers to implement mathematics reform recommendations. *Mathematics Teacher Education and Development*, 6, 73-91.
- Barrett, J. E., & Clements, D. H. (2003). Quantifying Length: Fourth-Grade children's developing abstractions for measures of linear quantity. *Cognition and Instruction*, 21(4), 475-520.
- Barrett, J. E., Jones, G. A., Thornton, C. A., & Dickson, S. (2003). Understanding Children's Developing Strategies and Concepts for Length. In D. H. Clements (Ed.), *Learning and Teaching Measurement*. Reston, VA: National Council of Teachers of Mathematics, pp. 17-30.
- Presmeg, N., & Barrett, J. E. (2003). Lesson study characterized as a multi-tiered teaching experiment. A research report in the *Proceedings of the Twenty-Seventh Annual Meeting of the International Group for the Psychology of Mathematics Education*. Honolulu, Hawaii, Vol. 4, 47-54.

Barrett, J., Jones, G., Mooney, E., Thornton, C., Cady, J., Guinee, P., & Olson, J. (2002). Working with novice teachers: Challenges for professional development. *Mathematics Teacher Education and Development*, 4, 15-27.

Books

Barrett, J. E., Clements, D. H., & Sarama, J. (Eds.). (2017). *Children's Measurement: A Longitudinal Study of Children's Knowledge and Learning of Length, Area, and Volume*. *Journal for Research in Mathematics Education Monograph Series*, no. 16. Reston, Va: National Council of Teachers of Mathematics.

Barrett, J. E., Cullen, C. J., Klanderma, D., & Behnke, D. (2017). *A Pleasure to Measure*. (National Council of Teachers of Mathematics): Reston, Va.

Book Sections

Smith, J. P., & Barrett, J. E. (forthcoming). The learning and teaching of measurement: Coordinating quantity and number. In J. Cai (Ed.), *Compendium for Research in Mathematics Education*. (National Council of Teachers of Mathematics): Reston, Va.

Barrett, J. E., Cullen, C. J., Miller, A. L., Eames, C., Kara, M., & Klanderma, D. (2017). Chapter 5, Area in the Middle and Later Elementary Grades. In J. E. Barrett, D. H. Clements, & J. Sarama (Eds.), *Children's measurement: A longitudinal study of children's knowledge and learning of length, area and volume (Journal for Research in Mathematics Education, Monograph)* (Vol. 16, pp. 105-128). Reston, Va: National Council of Teachers of Mathematics.

Barrett, J. E., Clements, D. H., Sarama, J., Miller A. L., Cullen, C. J., Van Dine, D. W., Newburgh, K., Vukovich, M., Eames, C., & Klanderma, D. (2017). Chapter 6, Integration of Results: A Revised Learning Trajectory for Area Measurement. In J. E. Barrett, D. H. Clements, & J. Sarama (Eds.), *Children's measurement: A longitudinal study of children's knowledge and learning of length, area and volume (Journal for Research in Mathematics Education, Monograph)* (Vol. 16, pp. 129-150). Reston, Va: National Council of Teachers of Mathematics.

Barrett, J. E., Sarama, J., Clements, D. H., Cullen, & Van Dine, D. W. (2017). Chapter 11, Reflections on the Design and Outcomes of the Research. In J. E. Barrett, D. H. Clements, & J. Sarama (Eds.), *Children's measurement: A longitudinal study of children's knowledge and learning of length, area and volume (Journal for Research in Mathematics Education, Monograph)* (Vol. 16, pp. 223-244). Reston, Va: National Council of Teachers of Mathematics.

Stevens, S., Wenk-Gotwals, A., Jin, H., & Barrett, J. (2015). Chapter 3: Learning Progressions Research Planning and Design. In M. Solem, N. Tu Huynh, R. Boehm

(Eds.), *Learning Progressions for Maps, Geospatial Technology, and Spatial Thinking: A Research Handbook*. (Cambridge Scholars Publishing): Newcastle, UK.

Barrett, J., & Jin, H. (2015). Chapter 4: Examples of Research Tools Developed in Mathematics Education and Science Education. In M. Solem, N. Tu Huynh, R. Boehm (Eds.), *Learning Progressions for Maps, Geospatial Technology, and Spatial Thinking: A Research Handbook*. (Cambridge Scholars Publishing): Newcastle, UK.

Barrett, J. E., & Battista, M. (2014). Comparing Learning Trajectories and Levels of Sophistication in the Development of Students' Reasoning about Length: A Case Study. In A. Maloney, J. Confrey, and K. Nguyen (Eds.), *Learning Over Time: Learning Trajectories in Mathematics Education*. (Information Age Publishing): Raleigh North Carolina.

Conference Papers

O'Dell, J., Rupnow, T., Cullen, C. J., Barrett, J. E., Clements, D. H., & Sarama, J. (2016). Developing an understanding of children's justifications for the circle area formula. Paper presented at the *38th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, Tucson, Arizona.

Barrett, J. E., Cullen, C. J., Sarama, J., & Clements, D. H. (2016). *Investigating the intersection of spatial measurement and school mathematics*. Barrett presented this invited paper to members of Topic Study Group 9 on Measurement, at the 13th International Congress on Mathematics Education. Hamburg, Germany, July 24-31, 2016.

Eames, C., Barrett, J. E., Cullen, C. J., & Klanderma, D. (2016). Evaluating a hypothetical learning trajectory for length measurement using a partial credit Rasch model. A paper presented to the Topic Study Group 9 on Measurement, at the 13th International Congress on Mathematics Education. Hamburg, Germany, July 2016.

Sarama, J., Clements, D. H., & Barrett, J. E. (2016). Development of Foundational cognitions and concepts of measurement in the early years. A paper presented to the Topic Study Group 9 on Measurement, at the 13th International Congress on Mathematics Education. Hamburg, Germany, July 2016.

Rupnow, T., Cullen, C., Barrett, J., and Beck, P. (2016). Students' Reasoning About Volume Structuring: Right and Oblique Prisms. A paper presented (by Rupnow) at the Annual Conference of the American Educational Research Association, Washington D. C., April 8, 2016.

Barrett, J. E., Cullen, C. J., Beck, P. S., Eames, C. L., Clements, D. H., Sarama, J. & Klanderma, D. (2015). *Children's Estimation and Measurement of Area*. Paper presented at the 2015 Annual Meeting of the American Educational Research Association, Chicago, IL, April 16-19, 2015.

-
- Rupnow, T. J., Cullen, C. J., Beck, P. S., Barrett, J. E., Clements, D. H., Sarama, J. (2015). Children's three dimensional mental structuring using a dynamic computer environment. A brief research report in Bartell, T. G., Bieda, K. N., Putnam, R. T., Bradfield, K., & Dominguez, H. (Eds.). (2015). *Proceedings of the 37th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. East Lansing, MI: Michigan State University.
- Cullen, C. J., Barrett, J. E., Clements, D. H., Sarama, J. Eames, C. L., Miller, A. L., Klanderma, D. (2014). *Supporting Children's Learning of Area Measurement: A Microgenetic Study*. Paper presented at the 2014 Annual Meeting of the American Educational Research Association, Philadelphia, PA, April 4 – 7, 2014.
- Stevens, S., Wenk-Gotwals, A., Jin, H., & Barrett, J. (2014). Chapter 3: Learning Progressions Research Planning and Design. In M. Solem, N. Tu Huynh, R. Boehm (Eds.), *GeoProgressions: Learning Progressions for Maps, Geospatial Technology, and Spatial Thinking: A research Handbook*. This is a working handbook for research in geography education presented at the Geoprogressions Conference, October 9-12, 2014 in Washington, DC. The meeting was sponsored by the Association of American Geographers.
- Barrett, J., & Jin, H. (2014). Chapter 4: Examples of Research Tools Developed in Mathematics Education and Science Education. In M. Solem, N. Tu Huynh, R. Boehm (Eds.), *GeoProgressions: Learning Progressions for Maps, Geospatial Technology, and Spatial Thinking: A research Handbook*. This is a working handbook for research in geography education presented at the Geoprogressions Conference, October 9-12, 2014 in Washington, DC. The meeting was sponsored by the Association of American Geographers.
- Eames, C. L., Miller, A. L., Kara, M., Cullen, C. J., & Barrett, J. E. (2013). *The longitudinal development of unit concepts in area and volume measurement contexts: A case study*. Paper to be presented at the 35th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Chicago, IL, November 14 – 17, 2013.
- Wickstrom, M. H., Baek, J., Barrett, J. E., Cullen, C. J., & Tobias, J. M. (2012). *Teacher's noticing of children's understanding of linear measurement*, in Van Zoest, L. R., Lo, J.-J., & Kratky, J. L. (Eds.). (2012). *Proceedings of the 34th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Kalamazoo, MI: Western Michigan University, pp. 488-494.
- Kara, M., Miller, A. L., Cullen, C. J., Barrett, J. E., Sarama, J., & Clements, D. H. (2012). "A retrospective analysis of students' thinking about volume measurement across grades 2-5", in Van Zoest, L. R., Lo, J.-J., & Kratky, J. L. (Eds.). (2012). *Proceedings of the 34th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Kalamazoo, MI: Western Michigan University, pp. 1016-1023.

-
- Miller, A. L., Kara, M., Eames, C. L., Cullen, C. J., & Barrett, J. E. (2012). A comparison of three students' responses to area invariance tasks across grades 2-5", in Van Zoest, L. R., Lo, J.-J., & Kratky, J. L. (Eds.). (2012). *Proceedings of the 34th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Kalamazoo, MI: Western Michigan University, p. 1042.
- Kara, M., Eames, C. E., Miller, A. L., Cullen, C. J., & Barrett, J. E. (2011). Developing and understanding of area measurement concepts with triangular units. In L. R., Wiest, & T. Lamberg (Eds.), *Proceedings of the 33rd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1015-1023). Reno, NV: University of Nevada, Reno.
- Clements, D., Sarama, J., Van Dine, D., McDonel, J., & Barrett, J. (2011). *A Hypothetical Learning Trajectory for Volume in the Early Years*. Paper presented at the Annual Meeting for the American Educational Research Association, New Orleans, LA, April, 2011, an unpublished manuscript at the University at Buffalo (SUNY), Buffalo NY.
- Cullen, C. J., Witkowski, C., Miller, A. L., Barrett, J. E., Sarama, J. A., & Clements, D. H. (2010). Tasks and Design of Assessment with a Learning Trajectory for Length. *Proceedings of the 32nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Columbus, OH: Ohio State University.
- McCool, J. K., & Barrett, J. E. (2010). Incorporating a Measurement Learning Trajectory Into a Teacher's Toolbox for Facilitating Student Understanding of Measurement. *Proceedings of the 32nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Columbus, OH: Ohio State University.
- Barrett, J., Clements, D., Cullen, C., McCool, J., Witkowski, C., & Klanderma, D. (2009). Children's Abstraction of Iterative Units to Measure Linear Space: A Trajectory. A paper presented at the *Annual Meeting of the American Educational Research Association (AERA)*. San Diego, California, April 16, 2009. An unpublished manuscript at Illinois State University.
- Clements, D., Sarama, J., Schiller, J., Piyose, N. & Barrett, J. Hypothetical Learning Trajectory for Length: A Multidisciplinary Study. A paper presented at the *Annual Meeting of the American Educational Research Association (AERA)*. San Diego, California, April 15, 2009. An unpublished manuscript, at the University at Buffalo, SUNY.
- Barrett, J. (2008). Models of Student Learning: Learning Trajectories for integrating Curriculum Development, Professional Development and Assessment. An invited paper presented at *Session V: Perspectives of STEM Education from Mathematics*

Education, for the 2008 Annual Meeting of the Mississippi Valley Conference of Technology Educators, held in St. Louis, Missouri, November 7, 2008. Unpublished manuscript, Illinois State University.

- Knapp, A., Barrett, J. E., and Kauffman, M. (2007). Prompting teacher knowledge development using dynamic geometry software. Paper in: Lamberg, Teruni (Ed.) (2007). *Proceedings of the 29th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Reno, Nevada. See [CD-ROM] download at <http://www.pmena.org/2007/cd/index.htm>
- Barrett, J. E., McCrone, S., & Presmeg, N. C. (2006). Connected Registers for Geometry: Learning to Generalize. Paper in: Alatorre, S., Cortina, J.L., Sáiz, M., and Méndez, A.(Eds) (2006). *Proceedings of the 28th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Mérida, México: Universidad Pedagógica Nacional. See [CD-ROM] download at: <http://www.pmena.org/2006/cd/index.htm>
- Barrett, J. E., Nendurada, R., & Olson, J. C. (2005). Integrating the Mathematics of Measurement Into an Elementary Teachers' Classroom Pedagogy: Collaborative Design as a Professional Development Tool. Paper presented at *the Psychology of Mathematics Education, North American Meeting*, Roanoke, VA. [CD-ROM]
- Yu, P. W., & Barrett, J. E. (2005). *Discourse and Prototype Development among Middle School Students in a Dynamic Geometric Environment*. Paper presented at the Psychology of Mathematics Education, North American Meeting, Roanoke, VA. [CD-ROM]
- Barrett, J. E. (July, 2005). PRIME Mathematics Project, K-5: Institutionalizing Reform Teaching. This paper was initially presented at the Final Local Systemic Change: Teacher Enhancement Conference, August 3-4, 2006. Paper published at the website, *Professional Development for Mathematics and Science Teachers: Findings from a Decade of Local Systemic Change (LSC) Projects: Lessons Learned: Papers Written by LSC PIs*. See download at: <http://pdmathsci.net/findings/memos>. Downloaded, January 28, 2008.
- Barrett, J. E. (July, 2005). PRIME Mathematics Project, K-5: Impacts on Student Achievement. This paper was initially presented at the Final Local Systemic Change: Teacher Enhancement Conference, August 3-4, 2006. Paper published at the website, *Professional Development for Mathematics and Science Teachers: Findings from a Decade of Local Systemic Change (LSC) Projects: Lessons Learned: Papers Written by LSC PIs*. See download at: <http://pdmathsci.net/findings/memos>. Downloaded, January 28, 2008.
- Barrett, J. E., & Klanderma, D. (2005). *A Christian Constructivist? The Impact of Worldview on Learning Theories and the Mathematics Education Research*

Community. Paper presented at the Biennial Meeting of the Association of Christians in the Mathematical Sciences, Huntington College, Huntington, Indiana.

Barrett, J. E., Jones, G. A., Mooney, E. S., Thornton, C. A., Cady, J., Olson, J. C., & Guinee, P. (2002). Understanding Novice Teachers: Contrasting Cases. In D. S. Mewborn & P. Sztajn & D. Y. White & H. G. Wiegel & R. L. Bryant & K. Nooney (Eds.), *Proceedings of the twenty-fourth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 3, pp. 1417-1425). Columbus, OH: ERIC Clearing house for Science, Mathematics, and Environmental Education.

Olson, J. C., Barrett, J. E., & Jones, G. A. (2002). The change of teachers' concerns while participating in a systemic professional development project. In D. S. Mewborn & P. Sztajn & D. Y. White & H. G. Wiegel & R. L. Bryant & K. Nooney (Eds.), *Proceedings of the twenty-fourth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 3, pp. 1634-1637). Columbus, OH: ERIC Clearing house for Science, Mathematics, and Environmental Education.

Yu, P. W., & Barrett, J. E. (2002). Shapes, Actions and Relationships: A Semiotic Investigation of student discourse in a dynamic geometric environment. In D. S. Mewborn & P. Sztajn & D. Y. White & H. G. Wiegel & R. L. Bryant & K. Nooney (Eds.), *Proceedings of the twenty-fourth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 775-784). Columbus, OH: ERIC Clearing house for Science, Mathematics, and Environmental Education.

Presmeg, N., & Barrett, J. (2002). Concepts of operational symmetry: A longitudinal study with elementary school students. A Poster summary paper in the *Proceedings of the Twenty-sixth Conference of the International Group for the Psychology of Mathematics Education, Norwich, England, July 21-26, 2002*.

Barrett, J. E., Clements, D. H., Klanderma, D. B., Pennisi, S. J., Polaki, V. (2001). *Children's Developing Knowledge of Perimeter Measurement in Elementary, Middle, and High School*. Educational Resources Information Center, ERIC Number: ED455125. (Paper as presented at AERA Annual Meeting, Seattle, WA, April, 2001).

Olson, J. C., & Barrett, J. E. (2001). Confronting constructivist pedagogy: Interpreting two first-grade teachers' conceptions of innovative pedagogy for arithmetic. Short research summary in Speiser, R. & Maher, C. (Eds.), *Proceedings of the Twenty-third Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 959-960). Snowbird, UT.

Barrett, J. E. (2000) Spatial Structuring as a Coordination of Mental Models and Schemes for Measuring Perimeter and Path Length: Second-Grade Children's Accounts of Linear Quantity. In Fernandez, M. (Ed.), *Proceedings of the Twenty-second Annual*

Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. (Vol. 1, pp. 271-275). Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education. (In ERIC Document Reproduction Service No. SE 064 088.)

Barrett, J. E., Clements, D. H. (1999). *Quantifying Length: Children's developing abstractions for measures of linear quantity in one-dimensional and two-dimensional contexts.* Educational Resources Information Center, ED443820. (Paper as presented at AERA Annual Meeting, Montreal, Canada: April, 1999).

Barrett, J. E., & Clements, D. H. (1998). Analyzing children's length strategies with two-dimensional tasks: What counts for length? In Berenson, S. (Ed.), *Proceedings of the Twentieth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education.* (Vol. 1, pp. 321-327). Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education. (In ERIC Document Reproduction Service No. SE 061 830.)

Barrett, J. E. & Clements, D. H. (1996). Representing, connecting and restructuring knowledge: A micro-genetic analysis of a child's learning in an open-ended task involving perimeter, paths, and polygons. In Jakubowski, E., Watkins, D., and Biske, H. (Eds.), *Proceedings of the Eighteenth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education.* (Vol. 1, pp. 211-216). Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education. (In ERIC Document Reproduction Service No. SE 059 001.)

Teaching Resources in Edited Books or Web-based collections

Rupnow, T., Barrett, J., Cullen, C. and Eames, C. (Spring, 2016). Volume of Prisms by Unit Cubes: A software resource (Geogebra) for teaching volume measurement. See the button at:

<http://www.childrensmeasurement.org/resources.html> and also at:
<http://www.geogebra.org/m/2811005>

Barrett, J., Sarama, J., Clements, D., Cullen, C., & van Dine, D. Children's Measurement Project website, April, 2012. The website includes learning trajectories for length, area and volume measurement, available at:

<http://childrensmeasurement.org/>

Experimental Development of Instructional Materials-

Design work for instruction with elementary students: I have collaborated with the members of the Measurement Mini-Center to contribute learning trajectory descriptions of the curricular levels of length, area and volume measurement to the

[Learning Trajectories Hexagon Map of the Common Core Mathematics Standards](#)

This is an online curriculum and standards support for the Common Core State Standards for Mathematics, at the website:

<http://www.turnonccmath.com/>

Barrett, J. (2006) Activities from the Joint Mathematics Meetings User's Group for The Geometer's Sketchpad held in San Antonio, Texas, January, 2006, entitled: *It's One Thing to Construct, and Another Thing to Explain*. Available at:
http://www.dynamicgeometry.com/General_Resources/User_Groups/JMM_2006.html

Barrett, J. (2003) "Stretching Ruler", which appears in, *Sketchpad activities for young learners: Grades 3-5*, (editor, Nathalie Sinclair), pp. 38-41. This is a web-based teaching resource supporting the development of Sketchpad in Grades 3-5: published electronically by Key Curriculum Press: Berkeley, CA. The preliminary version is available at:
http://www.dynamicgeometry.com/General_Resources/Classroom_Activities/KCPT/Activities_for_Young_Learners/Sketchpad_for_Grades_3-5/Activities.html

Barrett, J. (2003) "Curved Path", which appears in, *Sketchpad activities for young learners: Grades 3-5*, (editor, Nathalie Sinclair), pp. 42-44. This is a web-based teaching resource supporting the development of Sketchpad in Grades 3-5: published electronically by Key Curriculum Press: Berkeley, CA. The preliminary version is available at:
http://www.dynamicgeometry.com/General_Resources/Classroom_Activities/KCPT/Activities_for_Young_Learners/Sketchpad_for_Grades_3-5/Activities.html

Barrett, J. E., Dickson S. (2003). Broken Rulers. In D. H. Clements and G. Bright (Eds.), *Classroom Companion: Learning and Teaching Measurement, 2003 NCTM Yearbook*. Reston, VA: National Council of Teachers of Mathematics, pp. 11-14.

Clements, D., Tierney, C., Murray, M., Akers, J., & Sarama, J. (1998) *2-D Geometry: Picturing Polygons*, a curriculum unit for grade 5 from Investigations in Number, Data and Space. White Plains, NY: Dale Seymour Publications. [Barrett helped develop and write the curriculum/software module in his role as a Graduate Assistant, including field-testing and revising software activities for geometric similarity (Investigation 3, pages 80-111).]

Clements, D. H., & Sarama Meredith, J. (1994) *Turtle Math: Teacher's Resource*. Highgate Springs, VT: Logo Computer Systems, Incorporated. [Barrett, J. was a contributing writer for the project, specifically the section entitled: "Parachuting Probability".]

Published Reviews

Miller, A. L. & Barrett, J. E. (2016). Surveying Current Research on Young Children's Mathematical Learning. [A review of Reconceptualizing Early Mathematics, edited by

English and Mulligan], *Journal for Research in Mathematics Education*, 47 (3), p. 312-316.

Barrett, J. E. (1995). [Review of] The Cruncher. *Teaching Children Mathematics*. 1(5), p. 306.

Barrett, J.E. (1996). [Review of] Number Jumpers. *Teaching Children Mathematics*, 3(4), pp. 200-201. Activities:

Conference Presentations

Izsak, A., **Barrett, J. E.**, Beckmann, S., Cullen, C., & Kulow, T. (2017, April). *New Research Integrating Measurement and Multiplication in Middle Grades*. I presented a research report in this symposium at the Research Conference of the National Council of Teachers of Mathematics, held in San Antonio, Texas, April 3-5, 2017.

Barrett, J. E., Cullen, C., Sarama, J. & Clements, D. H. (2016, July). *Investigating the intersection of spatial measurement and school mathematics*. I presented an invited paper in a talk at the Topic Study Group Number 9, at the Thirteenth International Congress on Mathematics Education (ICME-13), held in Hamburg, Germany, July 26, 2016.

Barrett, J. E. (2016, July). I co-chaired presentations at the ICME-13 Topic Study Group #9 on Measurement, held on July 27, 2016; also participated in all four days of meetings for the discussion group, in Hamburg, Germany, from July 26-30, 2016.

Craig Cullen, Doug Clements, **Jeff Barrett** and Doug Van Dine presented research at a symposium session: Structuring Two- and Three-Dimensional Space: A Focus on Representations, at the NCTM Research Conference in San Francisco, on Tuesday, April 12, 2016.

Barrett, J. E. (2016). I gave an invited talk, *Measure as a mathematical construction: developing knowledge of spatial quantity*. This was given as part of the MESA colloquium series in the College of Education at the University of Georgia, at Athens, Georgia, February 18, 2016.

Barrett, J. E. & Klanderma, D. (2015). I co-presented a paper, *Children's Estimation and Measurement of Area*. This was presented at the 2015 Annual Meeting of the American Educational Research Association, Chicago, IL, April 16-19, 2015.

Barrett, J., Cullen, C. J., & Beck, P. S. (2015). I co-presented a research session: *Building the Base and Attaching the Altitude: Measuring Triangles*. This was a professional development report of research and practice, presented at the 93rd Annual Meeting of the National Council of Teachers of Mathematics: Boston, April 16-18, 2015.

Barrett, J. (2014, October). I presented an invited talk, *Using Design-Based Research to Build Learning Progressions*, and I also co-presented a working session with Prof. Hui Jin (of The Ohio State University) on *Clinical Interviews in Design Research on Progressions*. These talks were given at the GeoProgressions Conference, sponsored by the Association of American Geographers, held in Washington DC, on October 9-12, 2014.

Barrett, J. (2014, August). I presented a poster at the DR K-12 PI Conference of the National Science Foundation (CADRE). *Learning Trajectories 2.0: Identifying Critical Steps for “upgrading” an LT*. The conference was held on August 5, 2014.

Smith, J., Massey, C., Clements, D. H., **Barrett, J. E.**, Van Dine, D., & Eames, C. L. (2014). *Conceptualizing and supporting development: Learning area measurement in school*. I gave a talk at a Symposium for the Research Session of the 2014 Annual Conference of the National Council of Teachers of Mathematics, which was held in New Orleans, LA, April 8, 2014.

Eames, C. L., **Barrett, J. E.**, Sarama, J. (2014, April). *Interactions among learning trajectories for length, area, and volume measurement*. Paper presented at the Research PreSession of the 2014 Annual Conference of the National Council of Teachers of Mathematics, New Orleans, LA, April 9, 2014.

Barrett, J. (2013, November). I presented an invited research session: *Creating Powerful Learning Environments Based on Learning Trajectories*. This one-hour symposium was given at NCTM Regional Conference and Exposition held at Louisville, KY, November 6, 2013.

Barrett, J., & Eames, C. (2013, June). I co-presented a research report: *The Longitudinal Development of Children’s Conceptions of Spatial Measurement*. This research report was given at the Annual Meeting of the Jean Piaget Society held in Chicago, IL, on June 6, 2013.

Barrett, J., Cullen, Miller, Van Dine, Eames, Kara, Sarama and Clements (2013, April). I was a discussant and chair for a 90-minute symposium: *Framing and revising a hypothetical learning trajectory for area measurement*. The symposium was part of the Annual Research PreSession of the National Council of Teachers of Mathematics Meeting, held in Denver, CO, April 16, 2013.

Barrett, J. and Clements, C. (2012, June). We served as panelists at a research symposium: *Issues and opportunities for using learning trajectories as research tools*. The two-hour symposium was held at the *PI Conference for the DRK12 Program* of the National Science Foundation, held in Washington D.C. on June 15, 2012.

Clements, D., Sarama, J. and **Barrett, J.** (2012, June). We served as panelists at a research symposium: *Surveying the challenges of conducting longitudinal research in*

DR K-12 research and development projects. This two-hour session was held at the *PI Conference for the DRK12 Program* of the National Science Foundation, held in Washington D.C. on June 14, 2012.

Barrett, J., Baek, J. and Cullen, C. (2012, April). *Teachers' Learning of Learning Trajectories*, A symposium held at the National Council of Teachers of Mathematics 2012 Research Presession in Philadelphia, PA.

Barrett, J., Clements, D., Cullen, C., Van Dine, D., Eames, C., & Kara, M. (2011, September). *Volume Learning Trajectory Development, from PreK to Grade 5: Two case studies.* An invited presentation at the Third Annual Meeting of the Measurement Mini-Center Group, held at Illinois State University, Normal, IL.

Clements, D., Sarama, J., Van Dine, D., McDonel, J., & Barrett, J. (2011, April). *A Hypothetical Learning Trajectory for Volume in the Early Years.* Paper presented at the Annual Meeting for the American Educational Research Association, New Orleans, LA.

Barrett, J., **Cullen, C., Klanderma, D., Miller, A.,** & Witkowski, C. (2011, April). *Designing Integrative Learning Tasks for Unit Concepts Throughout Length, Area, and Volume Measurement.* Poster presented at the Annual Meeting for the American Educational Research Association, New Orleans, LA.

Cullen, C., Miller, A., Witkowski, C., Barrett, J., & Sarama, J. (2011, April). *Area Hypothetical Learning Trajectory: Relating Square Units to Nonrectilinear Regions.* Roundtable session presented at the Annual Meeting for the American Educational Research Association, New Orleans, LA.

Clements, D., Sarama, J., **Barrett, J., Cullen, C.,** Miller, A., Van Dine, D., & McDonel, J. (2011, April). *Measurement Research and Practice.* Symposium conducted at the research Presession of the Annual Meeting of the National Council of Teachers of Mathematics, Indianapolis, IN.

Barrett, J., Clements, D., Sarama, J., Battista, M., & Smith, J. (2011, April). *Examining Learning Progressions, Trajectories, and Levels: Beyond Scope and Sequence.* Symposium conducted at the research Presession of the Annual Meeting of the National Council of Teachers of Mathematics, Indianapolis, IN.

Cullen, C., Miller, A., & Barrett, J. (2011, April). *Connecting Length, Area, and Volume Tasks through Units and Comparison.* Session presented at the Annual Meeting of the National Council for Teachers of Mathematics at Indianapolis, IN.

McCool, J., Holland, C. & Barrett, J. (2011, April). *Revealing and Addressing Students' Misconceptions of Perimeter and Area.* Session presented at the Annual Meeting of the National Council for Teachers of Mathematics at Indianapolis, IN.

Dan Heck, Jeffrey Barrett, Jim Hammerman, and Karen King, were invited panelists guiding a working session to consider the purposes and functions of evaluation in DR K-12 research and development projects, and test different approaches. The session was held at the *PI Conference for the DRK12 Program* of the National Science Foundation, held in Washington D.C. on Dec 3, 2010.

Barrett, J. Clements, D. and Sarama, J. Cullen, C., Witkowski, C. & Klanderman, D., *Addressing the Challenge of Learning and Teaching Measurement: Curricular, Learning and Teaching Analyses*. Our team presented three posters as part of a 90-minute structured poster session and presentation organized by John P. Smith, III, at the Annual Meeting of the American Educational Research Association at Denver, April 30-May 4, 2010.

Clements, D., Sarama, J., and Barrett, J. Evaluation of a Developmental Progression for Length Measurement Using the Rasch Model. This was a research paper presentation at the *Annual Meeting of the American Educational Research Association* held in Denver, April 30-May 4, 2010.

Barrett, J., Confrey, J., Maloney, A., Knuth, E., Clements, D., Sarama, J. and Daro, P. *Defining and Implementing Learning Trajectories as Research Tools*. This was a 90-minute symposium presented at the Research Pre-session for the Annual Meeting of the National Council of Teachers of Mathematics held in San Diego, April 19-21, 2010.

Barrett, J. & Cullen, C. *The Children's Measurement Project at Illinois State University, 2009*. A report presented at the first meeting of the Measurement Mini-Center held at Michigan State University: Lansing Michigan, September 17-19, 2009 (our ISU research team on children's measurement was included as one of six research teams constituting the Mini-Center as it was funded through a refereed review panel of the National Science Foundation, Reese Program).

Barrett, J., Clements, D., Cullen, C., McCool, J., Witkowski, C., & Klanderman, D. *Children's Abstraction of Iterative Units to Measure Linear Space: A Trajectory*. (refereed) A research report presented at the 2009 Annual Meeting of the American Educational Research Association: San Diego, California, April 16, 2009.

Clements, D., Sarama, J., Schiller, J., Piyose, N. & Barrett, J. *Hypothetical Learning Trajectory for Length: A Multidisciplinary Study*. (refereed) A research report presented at the 2009 Annual Meeting of the American Educational Research Association: San Diego, California, April 15, 2009.

McCool, J., Cullen, C. & Barrett, J. *From Numerals to Intervals and Back: How Young Children Think About Measuring*. An invited teacher development presentation at the 87th Annual Meeting of the National Council of Teachers of Mathematics: Washington, D.C., April 22-25, 2009.

Barrett, J. *Crafting Research Tools to Establish a Learning Progression on Measurement Knowledge*. A 75-minute workshop presented at the 2008 Discovery Research K12 PI Meeting (a program of the National Science Foundation), held in Washington, D.C., November 12-14, 2008.

Barrett, J. *Models of Student Learning: Learning Trajectories for integrating Curriculum Development, Professional Development and Assessment*. An invited panel presentation for *Session V: Perspectives of STEM Education from Mathematics Education*, at the 2008 Annual Meeting of the Mississippi Valley Conference of Technology Educators, held in St. Louis, Missouri, November 7, 2008.

Barrett, J. *It's One Thing to Construct, and Another Thing to Explain*. An invited presentation at the Joint Mathematics Meetings User's Group for The Geometer's Sketchpad held in San Antonio, Texas, January, 2006.

Yu, P. W., & Barrett, J. E. *Discourse and Prototype Development among Middle School Students in a Dynamic Geometric Environment*. A research presentation at the Psychology of Mathematics Education, North American Meeting, Roanoke, VA, October 21, 2005.

Barrett, J. E., & Klanderma, D. *A Christian Constructivist: The Impact of Worldview on Learning Theories and the Mathematics Education Research Community*. A Research paper presented at the Biennial Meeting of the Association of Christians in the Mathematical Sciences, Huntington, Indiana, June 2-4, 2005.

Olson, J., Barrett, J. & Williams, N. *Coaching Teachers In Their Classrooms To Implement Reform Mathematics*. A research report presented at the Association of Mathematics Teacher Educators Annual Meeting, San Diego, CA. January 28, 2004.

Barrett, J. *Measurement Units and Logical Relations in a Dynamic Geometry Environment*. A research presentation (invited) at the Dynamic Mathematics Visualization for Young Learners: Sketchpad in Grades 3-8: A Working Conference for Researchers, Curriculum Developers, and Educators, Chicago, IL, February 7-9, 2003.

See related materials at website for conference:

<http://www.keptech.com/dgylconf/proceedings/sketches.html>

Yu, P. W., & Barrett, J. E. *Shapes, Actions and Relationships: A Semiotic Investigation of student discourse in a dynamic geometric environment*. A (refereed) research presentation at the twenty-fourth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Athens, GA, October 29, 2002.

Barrett, J. *Reflections on the Conduct of a Teaching Experiment: Guiding A Second-Grade Teacher to Reconstruct a Measurement Curriculum Unit*. (Refereed)

presentation at the Research Pre-Session of the Annual Meeting of the National Council of Teachers of Mathematics, Las Vegas, April 2002.

Barrett, J., Jones, G. and Thornton, C. *Strategies for Fostering Number and Operation Sense: Systemic change in a mid-sized city*. An invited presentation at the 80th Annual Meeting of the National Council of Teachers of Mathematics: Las Vegas, April 21-24, 2002.

Barrett, J. *Using a Framework for Learning Measurement to Change Instruction*. (Invited research report) Presented at the Annual Research Council on Mathematics Learning Conference in Memphis, TN, March 7-9, 2002.

Barrett, J. & Clements, D. *Children's Developing Knowledge of Perimeter Measurement in Elementary, Middle, and High School*. At the 2001 (Refereed presentation) Meeting of the American Educational Research Association: Seattle, WA, April 10-14, 2001.

Barrett, J. *Spatial structuring as a coordination of mental models and schemes for measuring perimeter and path length: Second-grade children's accounts of linear quantity*. (refereed) Paper presented at the Twenty-second Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education at Tucson, Arizona: October 7-10, 2000.

Barrett, J. & Hunt, C. *Reflecting on strategies children use to measure perimeter and length*, (refereed presentation) at the National Council of Mathematics Teachers Annual Meeting: Chicago, IL: April 15, 2000.

Barrett, J. & Clements, D. *Quantifying Length: Children's Developing Abstractions for Measures of Linear Quantity In One-dimensional and Two-dimensional Contexts*. (refereed) Paper presented at the 1999 Annual Meeting of the American Educational Research Association: Montreal, Canada, April 19-23, 1999.

Barrett, J. & Clements, D. *Analyzing children's length strategies with two-dimensional tasks: What counts for length?* (refereed) Paper presented at the Twentieth Annual Meeting: North American Chapter of the International Group for the Psychology of Mathematics Education, Raleigh, North Carolina, November 1, 1998.

Barrett, J. *Representing and Restructuring Geometric Knowledge of Length: A Micro-genetic Analysis of Learning*. Invited presentation with the Mathematics Education Research Program at the Institute for Advanced Study/ Park City Mathematics Institute, Park City, Utah: July 14, 1998.

Barrett, J. & Ferrini-Mundi, J. *Employing clinical interview methodology to investigate student learning in undergraduate-level linear algebra courses: An introduction to the method*. Invited co-presentation at the Institute for Advanced Study/Park City Mathematics Institute, Park City, Utah, July 27, 1998.

Barrett, J. & Clements, D. *Representing, Connecting and Restructuring Knowledge: A Micro-Genetic Analysis of a Child's Learning in an Open-Ended Task Involving Perimeter, Paths, and Polygons*. (refereed) Paper presented at the Eighteenth Annual Meeting: North American Chapter of the International Group for the Psychology of Mathematics Education, Panama City, FL, October 12-15, 1996.

Short Oral Presentations at Conferences (Refereed and Invited Contributions):

Barrett, J., and Wickstrom, M. *Children's Measurement Project: Learning Trajectory Based Professional Development*. An invited talk, given at a research meeting held at the campus of North Carolina State University, Department of Teacher Education and Learning Sciences, on October 10-11, 2016.

Barrett, J. *Coordinating, Abstracting and Representing Quantity: In both Number Systems and Spatial Contexts*. An invited presentation at the Johns Hopkins Cognition Lab (the Baby Lab) for a research seminar held in Baltimore, Maryland on February 25, 2012.

Miller, A., Eames, C., & Barrett, J. *Trajectories of Three Students' Learning of Area Measurement, Grades 2-5*. A poster presentation at the Research Pre-session of the Annual Meeting of the National Council of Teachers of Mathematics, Philadelphia, PA, April, 2012.

Barrett, J. E., *The Role of Learning Trajectories in Professional Development*. A poster presentation session at the Mathematics Science Partnership Conference of the U.S. Department of Education, Chicago, IL, April 18-19, 2012.

Barrett, J. E., *Framing and Revising a Learning Trajectory for Volume Measurement: A Composite Case Study Based on the Historical Progressions of Two Students from Grade Pre-K to 5*. A poster presentation session at the REESE PI Meeting of the National Science Foundation, Arlington, VA, Oct 19-21, 2011.

Barrett, J. E., *Children's Measurement Project: Longitudinal Examination of Children's Unit Operations in Spatial Measurement*. A poster presentation session at the DR K12 PI Meeting of the National Science Foundation, Washington, D.C., Dec. 1-3, 2010.

Barrett, J. E., *Children's Measurement Project: Longitudinal Study of Learning Trajectories for Length, Area and Volume*. A poster presentation session at the REESE PI Meeting of the National Science Foundation, Arlington, VA, March 11-12, 2010.

Barrett, J. E., *Length Measurement Learning Trajectory: Validation of Learning Trajectories with Longitudinal Research*. I presented at a poster session and I co-directed one working group session at an invitational conference convened by the Consortium for Policy Research in Education (Teachers College, Columbia University) and the Friday Institute for Educational Innovation (North Carolina State

University, Raleigh, NC). The purpose of the meeting was to examine learning trajectories and their implications for national standards, curriculum and professional development. North Carolina State University, Raleigh, NC, August 10-12, 2009.

Schiller, J., Clements, D., Sarama, J. & Barrett, J. *Hypothetical Learning Trajectory for Measurement: A Multidisciplinary Study*. A Poster presentation at the Annual International Conference of the National Association for Research in Science Teaching, Garden Grove, CA., April, 2009.

Witkowski, C., Barker, D., Langrall, C., Barrett, J., & El-Zanati, S. *The role of representation in elementary level generalization activities*. A Poster presentation at the Research Pre-session of the Annual Meeting of the National Council of Teachers of Mathematics, Washington D.C., April, 2009.

Barrett, J. E., *Children's Measurement Project: A Longitudinal Study*. A poster presentation session at the REESE PI Meeting of the National Science Foundation, Washington, D.C., February 17-19, 2009.

Barrett, J. E., & Olson, J. C. *Integrating the Mathematics of Measurement Into an Elementary Teachers' Classroom Pedagogy: Collaborative Design as a Professional Development Tool*. A Short Oral Session at the Psychology of Mathematics Education, North American Meeting, Roanoke, VA., October 21, 2005.

Olson, J., Barrett, J. & Jones, G. (2002). *The change of teachers' concerns while participating in a systemic professional development project*. A poster session presented at the Twenty-fourth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Athens, GA.

Shealy, B. E., & Barrett, J. (1996). Making sense of being a teacher: effects of beliefs on three Preservice teachers. Summary paper. In Jakubowski, E., Watkins, D., and Biske, H. (Eds.), *Proceedings of the Eighteenth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. (Vol. 2, pp. 391-392). Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education.

Regional and State-level presentations:

On Friday, October 7, 2016, Jenna O'Dell presented a 50 minute professional development session at the Illinois Council of Teachers of Mathematics (ICTM) Annual Conference, entitled, *Why Teach Precision in a Math Class?* Focusing on middle-school teaching, this session provided video case studies and tasks for lessons to improve instructional plans. Barrett, B. Heller, and J. O'Dell prepared the materials for this workshop.

-
- Barrett, J. E., & Behnke, D. (2015) *Ridiculous Rulers and other Zany Measurement Ideas*. A PreK-2 Workshop, presented at the NCTM 2015 Regional Conference & Exposition: Nashville, Tennessee, November 19, 2015.
- Barrett, J. *Concurrent Sessions #1: Mathematics Ignites*. I served as an invited discussant and facilitator for a one-hour working session on mathematics education development at the *Common Visions, Common Goals* statewide conference of the Illinois Teacher Quality Program of Illinois Board of Higher Education (IBHE) and the Illinois Mathematics Science Program of the Illinois State Board of Education (ISBE) (Normal, IL, October 17, 2013).
- Barrett, J., McCool, J., Cullen, C. and Witkowski, C. *It All Counts for Something: Math Strategies for Scholastic Bowl Competition*. Invited talk at the Illinois Elementary School Association (IESA) Annual Scholastic Bowl Workshop, (Bloomington, IL, October 24, 2008).
- Kauffman, M. & Barrett, J. *Who learns with Geometer's Sketchpad?* Presented at the Annual Meeting of the Illinois Mathematics Teachers Association (Peoria, IL, Oct 21, 2007).
- Barrett, J. *Teaching Measurement and Geometry in grades 2-8*. Presented at the Annual Meeting of the Illinois Science Teachers Association (Bloomington, IL, July, 2004).
- Barrett, J. *Assessment issues related to K-5 teacher growth and assessment*. Presentations at the professional development conference for the PRISM GK-12 Fellows Project at Illinois State University. (PRISM Project, Normal, IL, July 2004).
- Barrett, J. Collaborative item writing and development in collaboration with Deborah Ball and Heather Hill focusing on Measurement/Geometry item writing to assess pedagogical content knowledge. (University of Michigan, May, 2004).
- Barrett, J. & Gaff, K. *Building Mathematical Foundations for Learning Measurement and Geometry*. An invited collection of four one-hour sessions presented at the Midwestern Regional Conference of The Association of Christian Schools International, Indianapolis, Indiana, October 2 and 3, 2003.
- Matthews, B., Presmeg, N., & Barrett, J. *Using Lesson Study to Develop Ways of Teaching Measurement in Grades 4 and 5*. A co-presentation our Lesson study project at: The Annual Conference of the Illinois Council of Teachers of Mathematics, Peoria, IL., October 17, 2002.
- Matthews, B., Presmeg, N., & Barrett, J. *Ways We Taught the Number of Steps to Peoria from Bloomington*. A co-presented account of our Lesson study project, Illinois Participants' Conference: Measuring in Grades 4 and 5. Aug 15, 2002.

Barrett, J. *Ways of Developing Measurement Precision through Activities with Perimeter and Polygons*. Chicago, Kelvyn Park High School, HECA grant program (State of Illinois), with Co-Principal Director: Edward Mooney. August 8-9, 2002.

Barrett, J. PRIME 2002 Summer Institute, Grade 4 Mathematics and Pedagogy Sessions. Peoria, IL. (1 week institute) June 3-7, 2002.

Barrett, J. PRIME 2001 Summer Institute, Grade 4 Mathematics and Pedagogy Sessions. Peoria, IL. (2 1-week institute courses) June, 2001.

Barrett, J. PRIME 2000 Summer Institute, Grade 4 Mathematics and Pedagogy Sessions. Peoria, IL. (3 1-week institute courses) June, 2000.

Barrett, J. *Measuring Up to Standards 2000: Teaching Measurement in Grades 2-6*, at Illinois Council of Mathematics Teachers Annual Meeting, October 22, 1999.

Barrett, J. *Soft Geometry: Exploring Paths & Polygons on Computers in Grades 3-6*, at Illinois Council of Mathematics Teachers Annual Meeting, October 16, 1998.

Professional Development Workshops:

Barrett, J. & Black, M. I co-presented a five-day workshop series with Black for the LaSalle Peru Regional Office of Education (directed by Teri Rossman) through the *Intel Math for Teachers Curriculum* (part II). This course was presented at Illinois Valley Community College, on July 11-15, 2016.

Barrett, J., co-presented with Cullen, C., and Miller, A. This was a four-day professional development workshop series for an invited group of elementary teachers focusing on *Measurement Topics from the Learning Trajectories Project*. The workshop was held at the ISU campus, June 20-23, 2016.

On April 15, 2016: Pam Beck presented a professional development session entitled: *Volume Formulas, Are They All Right?* at the NCTM Annual Meeting in San Francisco. I was a co-presenter, assisting in the preparation of the talk with Cullen, Barrett, and Rupnow.

On April 16, 2016: Professors Craig Cullen (ISU) and David Klanderma presented a 75-minute workshop: *Measurement Activities for CCSSM*, A Workshop for teachers in Grades 3-5, at the Annual Meeting of the National Council of Teachers of Mathematics in San Francisco. I assisted in the preparation of this talk, along with Cullen and Klanderma.

Barrett, J. & Black, M. (2015). We co-presented a five-day workshop series with LaSalle Peru Regional Office of Education (directed by Teri Rossman) through the Intel Math for Teachers Curriculum (part I). The course was presented at Illinois Valley Community College, on July 13-17, 2015.

Barrett, J., co-presenting with Cullen, Baek and Tobias. A ten-day workshop series with Peoria District 150 elementary teachers in the Formative Assessment project. Presented during June and August, 2012.

Barrett, J., co-presenting with Cullen, Baek and Tobias. A ten-day workshop series with Peoria District 150 elementary teachers in the Formative Assessment project. Presented during June and August, 2011.

Barrett, Jeffrey co-presenting with Doug Clements, Jenni McCool and Jennifer Schiller. *A Symposium for Measurement Instruction in Elementary Classrooms* (with Metcalf teaching faculty for elementary mathematics), August 7 and 8, 2008 at Normal IL.

Clements, Doug, co-presenting with Julie Sarama, Jennifer Schiller, Jeff Barrett, Craig Cullen and Jenni McCool. *Symposium for Measurement Instruction in Early Childhood*. (with teachers from Western New York, held at the University at Buffalo campus) held August 25, 2008 at Amherst, NY.

Local Presentations:

Cullen, Barrett, and O'Dell gave a talk at GERM (ISU Math Department) on April 1, 2016. *Structuring 2 and 3 dimensional space: on representations for measurement*.

Jenna O'Dell presented her professional project, which Barrett co-directed with Craig Cullen. O'Dell presented her research at a GERM session in Spring, 2016. She reported on the analysis of measures of area for circles using algebraic formulations by middle school students.

Barrett, Jeffrey co-presenting with Craig Cullen and Chepina Witkowski. *Using short assessment activities to focus mathematics related to children's understanding of the number line and area measures, a series of seminar meetings* with a portion of the Metcalf teaching faculty for elementary mathematics on January 15, January 28, February 12, and March 26, 2009.

Barrett, J. *On the Use of Learning Trajectories*. Presented to the Group for Education Research in Mathematics (GERM) at ISU: November 19, 2008.

Barrett, Jeffrey co-presenting with Craig Cullen. *A Practical Analysis of Instructional Practices for Linear Units of Measurement with Students in Grades 2-4*, presented to the Metcalf teaching faculty for elementary mathematics at their inservice program, October 10, 2008.

El-Zanati, S., Barrett, J. Barker, D., Witkowski, C., & Langrall, C. A two-week summer course (2 hours per day) for elementary students entitled, *Wild World of Math*. This was a course offered through the College for Youth Program (Metcalf Summer Program 2008): for two weeks in July, 2008. The course served several purposes, including service to the community, practical trials of experimental teaching ideas, and a research setting for

working with undergraduate pre-service teachers learning about mathematics education research. The course centered on generalization and abstraction of ideas from situations and computational processes. The instruction was based on mathematical puzzles, number games, and explanations about how mathematics is discovered by researchers. (Data collected from the program will inform researchers about how mathematics is learned and taught). There were 8 students. July 7-18, 2008.

Barrett, J., with J. McCool and C. Cullen. *Describing a learning progression across the elementary grades: Examining students' thinking and strategies along a particular strand of related topics*. Presented to the Group for Education Research in Mathematics (GERM) at ISU: November 16, 2007.

Barrett, J., with D. Barker. *Digital data collection and analysis tools as procedures for mathematics education research*. Presented to the Group for Education Research in Mathematics (GERM) at ISU; April 16, 2007.

Barrett, J., Presmeg, N. and McCrone, S. *Concurrent observations from research on teaching and learning Geometric Reasoning in the context of our MAT 131 Course: Coordinating Students' Constructive Activities with Compass and GSP software to promote generalization and justification of concepts*. Presented to the mathematics education research group, ISU, March, 2006.

Knapp, A. and Barrett, J. *Findings on teacher's developing understanding and practice for teaching geometry with dynamic geometry*. Co-presented in April, 2006 to the mathematics education research group, ISU.

Barrett, J., Knapp, A., & Thompson, C. *Using Sketchpad to Teach Middle School Geometry: An Introduction to the Learning Environment*. Presented at the back-to-school professional academy for Unit 5 Secondary Teachers, August 23, 2005.

Thornton, C. & Barrett, J. *PRIME 2002 Principals Overview Session*. Peoria, IL. June 12, 2002.

Barrett, J. *PRIME 2002: With Grade 5 Teachers, Back to School Sessions*, Peoria, IL., August 13, 2002.

Barrett, J. *PRIME 2002: with Grade 4 Teachers, Back to School Sessions*, Peoria, IL. August 14, 2002.

Thornton, C. & Barrett, J. *PRIME 2001 Principals Overview Session*. Peoria, IL. June, 2001.

Barrett, J. *PRIME 2001: With Grade 5 Teachers, Back to School Sessions*, Peoria, IL., August, 2001.

Barrett, J. PRIME 2001: with Grade 4 Teachers, Back to School Sessions, Peoria, IL. August, 2001.

Thornton, C. & Barrett, J. PRIME 2000 Principals Overview Session. Peoria, IL. June, 2000.

Barrett, J. PRIME 2000: With Grade 5 Teachers, Back to School Sessions, Peoria, IL., August, 2000.

Barrett, J. PRIME 2000: with Grade 4 Teachers, Back to School Sessions, Peoria, IL. August, 2000.

Grant Work

External funding awarded (approximate total of \$6 million in awards)

Grants and Funded Projects:

National Science Foundation: Discovery Research K-12: Learning Trajectories to Support the Growth of Measurement Knowledge: Pre-K through Middle School.

Awarded July, 2012. Barrett serves as PI for this four-year study of children's developing knowledge and strategies, a collaborative project with Doug Clements and Julie Sarama at the University of Denver, and Craig Cullen, also of Illinois State University. The funding totals \$ 2.02 million, spanning 2012-2016.

Mathematics and Science Partnerships (Illinois State Board of Education): Awarded, March, 2011. Barrett serves as PI with C. Cullen, J. Baek and J. Tobias who are co-PIs: *Formative Assessment Improving Teachers' Instructional Practices*, a 2.5-year summer workshop program of professional development for elementary mathematics teaching (funding is approx. \$430,000 for 2.5 years beginning in March 2011, administered in three stages. Three stages have been funded: \$160,534 awarded June 2011, and \$185,894 for stage II, awarded October, 2011, and recently, \$99,613 for stage III, awarded October, 2012).

National Science Foundation: Discovery Research K-12: Applied research: Learning Progressions: A Longitudinal Examination of Children's Developing Knowledge of Measurement: Mathematical and Scientific Concept and Strategy Growth from Pre-K to Grade 5. Awarded August, 2007. Barrett serves as PI for this four-year study of children's developing knowledge and strategies, a collaborative project with Doug Clements at the University at Buffalo, SUNY Buffalo, New York. (four years: \$1,594,532)

Illinois State Board of Education (ISBE): Mathematics and Science Partnership: Barrett served as the original PI of the project: Institutes for Integrating Content-knowledge with Classroom-instruction (IICC): A Partnership for Improving Middle-School Mathematics

and Science. This 5-year professional development project is based on the design of a practice-oriented masters program. Since September of 2007, Barrett served as Co-PI with C. Langrall as PI. (funding for 9/1/2008 through 8/31/2009 was approximately \$200,000).

Illinois State Board of Education (ISBE): Mathematics and Science Partnership: *STEM Education and Leadership*, a 5-year development of a masters program to invent and establish a STEM leadership degree. Barrett is a co-PI and served as an assisting author on this funded proposal. The PI is C. Merrill of the College of Applied Sciences and Technology (ISU). (funding for 9/1/2008 through 8/31/2009 was approximately \$200,000).

Illinois State Board of Education (ISBE): Mathematics and Science Partnership: *Illinois State University Illinois Master Teacher-Leaders for Chemistry*. This is a 5-year development of masters program within the Department of Chemistry. Barrett is a co-PI and served as an assisting author on this funded proposal. The PI is W. Hunter of the College of Arts and Sciences (ISU). (funding for 9/1/2008 through 8/31/2009 was \$236,828).

National Science Foundation, Local Systemic Change Grant, and January, 2000 through June 2003: *The PRIME Mathematics K-5 Project*. Co-PI with Carol Thornton, Bob Carrescia and Mary Unser of Peoria School District # 150, Peoria Illinois. This grant program addresses the need for teacher development programs in 30 K-5 elementary schools for teaching mathematics. (four years: \$1,515,000).

Dynamic Mathematics Visualization for Young Learners: Sketchpad in Grades 3-8: A National Science Foundation-funded Working Conference for Researchers, Curriculum Developers, and Educators, Chicago, IL, 7-9 February 2003. Funding provided for *transportation, support and registration costs*. (approx. \$1000)

Institute for Advanced Study/Park City Mathematics Institute, Park City, Utah. *Study Grant*: Awarded during the Summer of 1998: A *two-week* Mathematics Education Research mentoring program with M. Battista and R. Lehrer addressing geometric thinking related to symmetry. Funding provided for *transportation, support and registration costs*. (approx. \$3000)

Internal funding awarded by Illinois State University

College of Arts and Sciences: <i>University Research Grant: Summer Faculty Fellowship program</i> : A project to examine students learning and understanding of geometry within the context of a middle-core general education course at ISU on	\$3000 (shared award with Norma	Presentations were given in Mexico (2006) and Korea (2007) based on this work. A written report
---	---------------------------------	---

geometric reasoning (MAT 131), as effected by use of a computer-based mathematical modeling software. Summer of 2006	and Sharon)	was published in the proceedings of the International PME in 2007.
Center for Teaching and Learning with Technology: Teaching and Learning Development Grant, entitled, <i>Engaging Dynamic Geometry Software Within a Teaching Cycle: Building an Assessment Window Into Student Thinking and Strategy</i> . Awarded jointly with Norma Presmeg and Sharon McCrone: May of 2006.	\$1500 for each co-PI	Presentations were given in Mexico (2006) and Korea (2007) based on this work. A written report was published in the proceedings of the International PME in 2007.
Illinois State Board of Education (ISBE) Scientific Literacy Grant, administered by CeMast and directed by C. Langrall: N. Presmeg and J. Barrett were awarded an internal (ISU) grant to conduct a Lesson Study project with grade 4 and 5 teachers to explore ways of improving instruction in Geometry during the period from January, 2002 through August of 2002.	\$27,000	A related research report was presented at the International Conference for the Psychology of Mathematics Education held in Hawaii, July, 2003.
<i>University Research Grant</i> (PFIG) Summer, 2001. Drs. Presmeg and Barrett collaborated on a study of the relation between symmetrical cognitive operations and strategies and children's mathematical reasoning in general across a broad developmental range from school grades 1 through 12, focusing first on grades 4 and 5.	\$3000	Research report was presented as a poster/paper at PME, Norwich, England, July, 2002.
<i>University Research Grant</i> :Summer, 1998. <i>Research topic</i> : Understanding the Growth of Children's Knowledge of Length for Geometric Paths.	\$3000	Related paper presented at PME/NA, 1998.

Grant Proposals Submitted

Submitted: December 2016	Jeff Barrett, Doug Clements (Univ. of Denver), Julie Sarama (Univ. of Denver), and Craig Cullen (ISU), submitted a proposal to extend learning trajectories to develop lesson materials for Ten Tough Problems in Spatial Measurement. <i>Submitted to DRK 12 Program of the National Science Foundation</i> , application amount: \$2.1 million.
Submitted: January, 2012	Jeff Barrett, Doug Clements (SUNY), Julie Sarama (SUNY), Craig Cullen, Willy Hunter (CeMaST) and George Rutherford (physics, ISU), submitted a proposal to evaluate and extend learning trajectories for spatial measurement, PreK through middle grades. <i>Submitted to DRK 12 Program of the National Science Foundation</i> , application amount: \$2,700,705.

Submitted: September, 2011	Jeff Barrett, Jae Baek, Craig Cullen and Jennifer Tobias submitted a workshop and professional development proposal for federal funding through ISBE. <i>Formative Assessment as a Tool for Professional Development: Stage II, funding from Oct 1, 2011 through Sept 2012.</i>
Submitted: January 24, 2011	Jeff Barrett, Jae Baek, Craig Cullen and Jennifer Tobias submitted a workshop and professional development proposal for federal funding through ISBE. <i>Formative Assessment as a Tool for Professional Development: Stage I, funding from Feb 2011 through Sept 2011.</i>
Submitted: November 15, 2010	Dr. Barrett submitted a collaborative research proposal to the National Science Foundation based on follow-up research from the ongoing Children's Measurement Project (NSF). These proposals will extend the work with the existing cohort of longitudinal case study students into grades 6-9, and it will revisit the present focus in grades preK to 5 to engage in professional development and to elaborate on Assessment tools being developed now. Collaborators: Craig Cullen and George Rutherford (ISU), Doug Clements and Julie Sarama (UB, SUNY).
Spring, 2010	Collaborated with Craig Cullen, Jennifer Tobias and Jae Baek on a proposal for Summer Workshops through the Illinois Mathematics and Science Partnerships Program (funding through the Department of Education). This project would focus on the Mathematical Concept Development through Measurement for teachers of Grades 1 through 5 (submitted to ISBE on March 11, 2010, <i>not funded</i>).
Fall, 2007	Dr. Barrett was co-author with Lead Author Agida Manizade (Clemson University) and co-author Gary Martin (Auburn University) of a full proposal to the Institutes for Education Research of the Department of Education. The proposal was entitled, <i>Measuring Teachers' Pedagogical Content Knowledge of Geometry and Measurement at the Middle School level</i> . (total budget: \$1,600,000) ISU subcontracts for \$156,000.
Spring, 2007	Dr. Barrett co-authored and submitted a <u>Full-proposal</u> in response to the solicitation of the Discovery Research K-12 program of the National Science Foundation , May, 2006. The proposal was entitled, <i>A Longitudinal Account of Children's Knowledge of Measurement: Mathematical and Scientific Concept Development from Pre-K through Grade Seven</i> , with Douglas Clements of University at Buffalo (SUNY) as co-principal investigator along with William Hunter and Karen Lind of Illinois State University (requesting an approximate budget of \$1,600,000 for a four-year project.)
Spring, 2007	Dr. Barrett co-authored and submitted a Full-proposal in response to the Illinois State Board of Education solicitation: Illinois Mathematics and Science Partnerships, 2007. Our proposal was entitled, <i>Institutes for Integrating Content-knowledge with Classroom-instruction (IICC): A Partnership for Improving Middle-School Mathematics and Science</i> . Co-PIs were C. Langrall, M. Morey, C. Merrill, and W. Hunter. The request involved a budget of \$191,000 for 15 months.

Barrett also assisted and served as co-PI on two other related proposals to the IMSP program of the Illinois State Board of Education, one in Technology Education and the other in Chemistry Education.

Fall, 2006	Dr. Barrett co-authored and submitted a <u>Preliminary-proposal</u> in response to the solicitation of the Discovery Research K-12 program of the National Science Foundation , May, 2006. The proposal was entitled, <i>A Longitudinal Account of Children's Knowledge of Measurement: Mathematical and Scientific Concept Development from Pre-K through Grade Seven</i> , with Douglas Clements of University at Buffalo (SUNY) as co-principal investigator along with William Hunter and Karen Lind of Illinois State University (requesting an approximate budget of \$1,300,000 for a four-year project.)
2006	Submitted a Preliminary Proposal to the Spencer Foundation with Sharon McCrone and Douglas Clements: <i>The Development of Measurement Knowledge from Pre-K through Grade 10: A Longitudinal Account of Students' Mathematical Understanding of Measurement</i> . Our initial proposal was not encouraged.
2005	College of Arts and Sciences (ISU): <i>University Research Grant: Summer Faculty Fellowship program</i> : Dr. Barrett authored a proposal to examine students learning and understanding of geometry within the context of a middle-core general education course at ISU on geometric reasoning (MAT 131), as effected by use of a computer-based mathematical modeling software.
September, 2004	Dr. Barrett co-authored and submitted a <u>Full Proposal</u> in response to the solicitation of the Teacher Professional Continuum program of the National Science Foundation, May, 2004, entitled, <i>Unpacking the mathematics of measurement in elementary school</i> , with Nerida Ellerton of Illinois State University as co-principal investigator, requesting an approximate budget of \$1,900,000.
September, 2003	Dr. Barrett co-authored and submitted a <u>Full Proposal</u> in response to the solicitation of the Teacher Professional Continuum program of the National Science Foundation, May, 2003, entitled, <i>Concept-based measurement instruction project</i> , with Janet Warfield of Illinois State University as co-principal investigator, requesting an approximate budget of \$1,200,000.
May, 2003	Dr. Barrett co-authored and submitted a <u>Pre-proposal</u> in response to the solicitation of the Teacher Professional Continuum program of the National Science Foundation, May, 2003, entitled, <i>Concept-based measurement instruction project</i> , with Janet Warfield of Illinois State University as co-principal investigator (requesting an approximate budget of \$900,000.) Reviews were received in July, 2003: one review was positive, one negative, and one was ambivalent, but recommended

substantive development of the research methodology. We revised our full proposal in accord with these suggestions.

-
- | | |
|------|--|
| 1998 | Drs. Thornton and Barrett co-authored and submitted a pre-proposal and a proposal for the Local Systemic Change program of Teacher Enhancement in ESIE of the National Science Foundation. We proposed a collaborative effort between ISU and District 150 of Peoria Illinois to engage their elementary teachers in a three-year professional development program involving the use of the NSF-funded elementary curriculum entitled, "Investigations in Number, Data & Space". We were encouraged to resubmit for the following funding year, which led eventually to a funded project. The proposed project involved a budget of approximately \$900,000. |
| 1998 | College of Arts and Sciences (ISU): <i>University Research Grant</i> : Dr. Barrett authored a proposal to examine the confluence of symmetry and measurement concepts in geometric learning and instruction. Whereas it was not funded, the research design developed for this proposal was adapted and extended in clinical interviews for a longitudinal study of symmetry among elementary-age children between 1999 and 2002. |
-

PROFESSIONAL SERVICE

International Activities:

Barrett served as an external examiner for a Ph.D dissertation, completed during September, 2015. This work was in collaboration with Professor Dragana Martinovic of the University of Windsor, Canada.

Barrett reviewed a proposal for funding for a National Grant Review Board in Canada (directed by Sue Geffken) in February 2015.

Barrett served as an external examiner for an M.Ed. Thesis. This work was in collaboration with Ken Clements as the Director of a Thesis at The University of Brunei (June, 2003).

National Activities:

I was invited to a two-day series of meetings, and asked to give a talk, along with Megan Wickstrom, entitled, *Children's Measurement Project: Learning Trajectory Based Professional Development*. The meeting was held at the campus of North Carolina State University, Department of Teacher Education and Learning Sciences, on October 10-11, 2016. As an outcome of this conference, several researchers are contributing chapters for an edited book on this topic. The project is scheduled to propose outlines for chapters to a publisher (Teachers College Press) in the Spring, 2017.

In the fall of 2013, I co-organized (with Jack Smith of MSU) and hosted a one-day conference with several active members from the Measurement Mini-center representing several universities: Michigan State, North Carolina State, and Florida State as well as ISU. We convened the meetings in Chicago at the ISU Downtown Office on November 14, 2013. Approximately 15 graduate students and faculty members attended the meeting.

I served as a reviewer for one book within a book series for NCTM, January, 2013.

In the Fall of 2011, I co-hosted a national-level conference of the Measurement Mini-Center, a collaborative group of researchers, both professors and doctoral students, engaged in research related to measurement (originally established at Michigan State University by Professor Jack Smith). The conference was held at Illinois State University, for three days of meetings from September 29 through October 1, 2011. There were approximately 30 attendees, and the program included working sessions and presentations involving members of eight different research organizations.

During August, 2011, I served as an external reviewer for a promotion case regarding a mathematics education researcher at a tier one state university in the U.S. to move from Assistant Professor rank to Associate Professor. I reviewed the publications, grant work, and other accomplishments of this candidate for promotion and wrote a letter reviewing the entire case.

I participated in an invitational working conference (November 16 and 17, 2010)

targeting the use of learning trajectories, research on measurement and assessment, technology delivery systems, and professional development to design effective diagnostic assessment. Such diagnostic assessment would be recommended for use as states begin implementation of the Core Curriculum Standards. The conference was convened at the Friday Institute For Educational Innovation, hosted by Jere Confrey, Alan Maloney and Glenn Kleiman. Our working groups were charged with formulating and communicating guidelines for designing and implementing diagnostic assessment to promote and implement the Core Curriculum Standards in Mathematics (CCSSO and NGA, 2010).

The Children's Measurement Project at ISU and UB (Barrett serves as Principal Investigator for this project) is one of the invited projects constituting the Measurement Mini-Center established at Michigan State University under the direction and coordination of Professor Jack Smith. The Mini-center focuses on the translation and dissemination of research in children's knowledge and strategies for measurement into related research, Curriculum Development, Assessment, and National Policy. The center is scheduled to begin in August, 2009, being funded through the REESE Program at the National Science Foundation. We met for the first time on September 17-19 at Michigan State University to collaborate on a national-level research agenda for children's understanding and strategies for measurement (the conference represents a collaboration among the following research teams, listed by university affiliation and directing faculty: Vanderbilt University (Richard Lehrer), University at Buffalo (SUNY) (Doug Clements & Julie Sarama), Iowa State University (Barbara Dougherty), Illinois State University, the Ohio State University (Michael Battista), and Michigan State University (Jack Smith).

Core Participant for an invited Panel of Mathematics Education Researchers for the Consortium for Policy Research in Education: Center on Continuous Instructional Improvement at Teachers College-Columbia University; September 2008 through the Fall of 2009. I helped organize and conduct a meeting held at the Friday Institute for Educational Policy at North Carolina State University from August 8-10, 2009 hosted by Drs. Jere Confrey and Alan Maloney. There is an expected outcome of a series of reports, including a formal report to be published by CPRE as summarized by Tom Corcoran, Frederic A. Moshier and Phillip Daro (this appeared: Winter, 2011). This project team addressing learning trajectories in mathematics education is also expected to support the present work on a national set of recommendations for curriculum being developed by the National Association of the Governors and by the national organization of the Chiefs of Education for 46 of our 50 states.

Invited Member of Advisory Panels for National Projects:

October, 2013 through December, 2016: Barrett serves as a member of the advisory board for the Mathematical Record Keeping Supports Cognition and Communication (MaRKS) project with funding from NSF's EHR Core program. This project has an official start date of October 1st, 2013. The project leaders and staff are from Horizon

Research (Raleigh), UNC-Charlotte, and EDC (Boston). Funding extends from 2013 through 2015.

October, 2013 through August 2015: Barrett serves as a member of the advisory board for a new exploratory project: *The AAG for Learning Progressions Research*. The National Science Foundation, through its Education and Human Resources Core Research program (Award DRL-1347859), has awarded a \$292,491 grant to the Association of American Geographers (AAG) for a project designed to build capacity for conducting research on learning progressions in geography. Dr. Michael Solem (AAG) will direct the project with co-investigators Dr. Niem Tu Huynh (AAG) and Dr. Richard Boehm (Texas State University). Learning progressions offer a means for educators to determine how students learn geographic facts, concepts, and skills, and whether they are on track toward attainment of a particular curriculum standard or set of standards. Barrett will join a group of approximately ten scholars from a variety of disciplines including science education, mathematics education, spatial cognition and geography as a consultant for math education.

September, 2010-2013: Barrett serves as a member of the advisory board (along with Catherine Sophian and Nita Copley) for the NSF DR K-12 project "PreK Early Algebra through Quantitative Reasoning (PreKEA). The Co-PIs are Zaur Berkaliev and Barbara Dougherty, of the Illinois Institute of Technology and University of Missouri (respectively).

August, 2009-Fall 2012: Barrett serves as the external auditor and on the advisory board (other members include: Marjorie Motague, Douglas Clements, and Arthur Baroody) for the NSF funded (*DR K-12 program*) project entitled, *A Study of the Struggling Learner's Knowledge and Development for Number and Operation* led by John Lannin and Delinda van Garderen of the University of Missouri at Columbia, MO. This three-year project begins its funded period on September 1, 2009.

September, 2009: I was invited to serve as a member of the Advisory Panel for a *proposed project*. An application is being submitted to the REESE Program Competition of the National Science Foundation by Gail Jones of North Carolina State University. The grant addresses student's understanding and learning of scale (proportion, units, magnitude) and problems of scaling in science learning and teaching for Grades 4-Undergraduate levels.

Reviewing Grant Submissions:

Member of proposal review panels for the *National Science Foundation*

- STEM development funding for graduate education in the US: Spring of 2016
- STEM development funding for graduate education in the US: Spring of 2015
- STEM development funding for graduate education in the US: Spring of 2014
- STEM Science focus panel in the DR K-12 Competition: Spring of 2010
- STEM Science focus panel in the DR K-12 Competition: Spring of 2010
- Informal Science Education focus panel in the DR K-12 Competition: August, 2009
- STEM Science focus panel in the DR K-12 Competition: Spring of 2009
- STEM Science focus panel in the DR K-12 Competition: Spring of 2008

Baruch College at CUNY: New York, New York; External Reviewer for the Education Panel to PSC-CUNY (1999).

Served during the Spring of 2006 as an Mathematics Education expert in teachers' knowledge of geometric reasoning for Doctoral Dissertation by Agida Manizade, candidate at the University of Virginia (this thesis was completed in May, 2006).

Reviewer for research proposals for National Conferences:
Annual Meetings of the *American Educational Research Association (AERA)*: 1999, 2001, 2004, 2006, 2007, 2009, and for the **2010 through 2016 Annual Meetings**. Most recently, I reviewed for AERA Division C3, or for the SIG/RME special interest group. Both involve extensive commitments to review proposals, through a process of selection to serve as a panelist.

National Council of Teachers of Mathematics Research Sessions: reviewing proposals for the 2010-2015 Programs.

Annual Meetings of the *North American Chapter of the International Group for the Psychology of Mathematics Education*: 1996, 1998, 2000, 2002, and 2006 Meetings.

Judge, Illinois State Mathematics Contest, 1998 and 1999.

Barrett planned, coordinated, and ran workshops for practicing teachers in Central Illinois (Peoria teachers from District 150 through the IMSP Formative Assessment project (Summer, 2011 and Summer 2012). Previously, Barrett co-directed Project PRIME and ran workshops for over 300 teachers, directly teaching the fourth-grade group of 30 teachers (Summers, 2000, 2001 and 2002), outlying areas around McLean County (TIP courses between 1999 and 2002).

Barrett co-delivered a professional development seminar in an urban area of Chicago with approximately 15 High School mathematics teachers. (Run by Edward Mooney, Summer, 2002).

Reviewing Manuscripts

I have served and continue to serve as a reviewer for the journals listed below:

Alberta Journal of Educational Research (2009)

Cognition and Instruction, 2006-present (1 manuscript reviewed in August 2016).

Reviewed 1 manuscript for *Computers and Education*, 2016.

Reviews: *Educational Studies in Mathematics*, 2010-2015.

International Educational Journal of Mathematics Education (2012)

Reviewed 1 manuscript for *Journal for Teacher Education*, 2016.

Reviews: *Journal for Research in Mathematics Education*, 1998-present (2 in 2016).

Learning and Individual Differences (published by Elsevier) 2006-2013.

Mathematical Thinking and Learning, 2012-present (2 in 2016).

I was selected as a member of the Editorial Board for the Journal,
Mathematical Thinking and Learning, as of October, 2016.

Mathematics Education Research Journal 2009-2013.

Reviewing External promotion cases:

During the summer of 2016, I served as an external reviewer on two tenure cases, for a two Carnegie I level universities in the U.S.

During the summer of 2015, I served as an external reviewer on a tenure case, for a large state university in the U.S.

During the summer of 2014, I served as an external reviewer on a tenure case, for a large state university in the U.S.

During the summer of 2013, I served as an external reviewer on two tenure cases, for two different research level one universities.

2011: Letter of Review submitted for a promotion case from assistant to associate professor for a flagship public research university in a state in the northeastern portion of the U.S.

University Service

Search committee member for Cross Chair Director: appointed by Dr. John Baur and Dean Gregory Simpson to select a Cross Chair faculty director, December 2015 through January 2016.

Search committee member for CeMaST Director: appointed by Dr. Rodney Custer to select a Director for the Center for Mathematics, Science and Technology (CeMaST), October, 2008.

I served as a Pilot Mentor in a Grant Development Program for Research and Sponsored Programs: I was invited by Dr. Rodney Custer to mentor a participant from another college (CAST) in a Grant proposal writing project, Spring, 2008 and again during the Spring of 2009 (a faculty member from CAS).

College of Arts and Sciences Service

Member of the Research Proposal Review Committee (2 year term: Fall, 2008 through Spring, 2010)).

Department of Mathematics Service

Master's level/doctoral level comprehensive exam panel member: 1999, 2002-2004, 2005, 2007.

Department of Mathematics Committees:

Member of the Ph.D. Committee for the Department (2010-2016).

Departmental Faculty Status Committee, 2011-2013.

Department Council, 1998, and 2004-2005 (served as Chair); 2009-2011.

Departmental Resource Committee (chair) Fall, 2005—2008.

Hiring Committee Member (Elementary Education Positions)

Course Coordinator, MAT 152: Structure of Number Systems II (Spring 2005- 2007)

Departmental Events Committee Fall 2005--2007

Master's Program Committee, 2001-2004

Mathematics Education Committee, 1997-2002

Technology Committee 1997-2000

Elementary Mathematics Education Committee (includes helping revise course sequences for middle school and supporting/piloting a new middle-core general education to support our sequence on quantitative reasoning, Geometric Reasoning (now offered as MAT 131)), 1997-2002

Coordinator for Technology and Computer Services for Mathematics Education (1998-2000)

Student Advising

Faculty Advisor to the Graduate Symposia, Spring, 2004.

Faculty Mentor participant -- presentations at Hamilton Residence, 4th floor, Fall, 1998

Presentations in courses at Illinois State University (invited talks):

Barrett, J., Cullen, C. & McCool, J. *Preliminary Findings of Investigating a Learning Trajectory for Measurement*. An invited presentation for MAT 585 (Mathematics Education Doctoral Seminar), Spring, 2008, with N. Ellerton.

Barrett, J. Analysis of Draft of Principles and Standards (NCTM) for *Measurement*. An invited presentation for MAT 585 (Mathematics Education Doctoral Seminar), Summer, 1999.

Barrett, J. *Analysis of Draft of Principles and Standards (NCTM) for Representations of Mathematical Thinking and Reasoning*. An invited presentation for MAT 585 (Mathematics Education Doctoral Seminar), Summer, 1999.

Barrett, J. *Pedagogical Implications of Constructivist Theory*, an invited presentation for Jane Swafford's MAT 403 course (theories of learning); April 22, 1998.

Awards:

The Children's Measurement research team (a collaboration of ISU and the University of Denver) recently produced and submitted a video entry in the national **video showcase** competition organized by the **National Science Foundation**. The video entry for our team received a *Facilitator's Award for 2016*; our video was one of 28 videos to be recognized among 156 entries. See the results at:

<http://stemforall2016.videohall.com/presentations#/winners/id=winners>

Department of Learning and Instruction, Graduate School of Education, University at Buffalo, SUNY: *Alumni of the Year, 2009*, as awarded on May 1, 2009 by the Learning and Instruction Graduate Student Association.

Member of the Million Dollar Club, awarded by President Al Bowman, Illinois State University. Awarded April 20, 2009.

Professional Memberships in Societies for Education Research or Development:

Member of American Educational Research Association since 1999;

Member of the National Council of Teachers of Mathematics;

Member of the North American Group for the Psychology for Mathematics Education.