

Esther M. Huntzinger Billings

Associate Professor of Mathematics

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Education

PH.D. - DEPT. OF MATHEMATICAL SCIENCES - NORTHERN ILLINOIS UNIVERSITY My dissertation entitled, <u>Qualitative-based Reasoning Among Preservice Elementary School Teachers in Proportional Situations</u> , was completed under the direction of Dr. Helen Adi Khoury. GPA: 3.98	August 1998 DEKALB, IL
M.S. - DEPT. OF MATHEMATICAL SCIENCES - NORTHERN ILLINOIS UNIVERSITY Major: Pure Mathematics GPA: 3.97	August 1995 DEKALB, IL
B.S. - WHEATON COLLEGE Major: Mathematics GPA: 3.71 Emphasis: HNGR - Human Needs & Global Resources	May 1992 WHEATON, IL

Teaching

Teaching Opportunities at the College and Community College Levels

GRAND VALLEY STATE UNIVERSITY -- Associate Professor of Mathematics (August 2005 – Present)
Assistant Professor of Mathematics (August 1998 – May 2005)

- Intermediate Algebra (MTH 110)
- Tutoring in Mathematics (MTH 180)
- Mathematics for Elementary Teachers 1 (MTH 221)
- Mathematics for Elementary Teachers 2 (MTH 222)
- Algebra for Elementary Teachers (MTH 324, formerly MTH 321)
- Senior Thesis (Capstone) (MTH 496)

I utilize an active, discovery and problem-based approach incorporating: cooperative group learning, manipulatives, critical thinking, writing, projects, and use of technology when appropriate (computer and calculators).

NORTHERN ILLINOIS UNIVERSITY -- Graduate Teaching Assistant (Dept. of Mathematical Sciences)
(Fall 1995 – Summer 1997)

- (Transitional) College Algebra: Part 2 (MATH 110P)
- (Transitional) College Algebra: Part 1 (MATH 109P)
- Foundations of Elementary School Mathematics 1 (MATH 201)
- The Teaching and Learning of Algebra (MATH 513)

I utilized graphing calculators, group projects, manipulatives, and writing assignments in the teaching of these classes. I was given full responsibility in the teaching of these courses.

COMMUNITY COLLEGE TEACHING EXPERIENCES – Part Time Instructor (Summer 1994, Fall 1995)

- College Algebra (MATH 110) -- Fall 1995 [Waubonsee Community College]
- Trigonometry (MATH 155) – Summer 1994 [Kishwaukee College]

CAMEROON BAPTIST THEOLOGICAL SEMINARY (Ndu, Cameroon, West Africa) – Instructor

(Fall 1991 – a 6 month internship through Wheaton College, Wheaton Illinois)

- Basic Mathematics
- Basic Composition

Teaching Opportunities at the PreK-12 Grades

DEKALB HIGH SCHOOL-- Full Time Substitute Mathematics Teacher (Oct. 1997 – Jan. 1998)

- General Mathematics
- Applied Mathematics

As a substitute teacher, during a continuous period of 3 months, I assumed full responsibility to teach and to create original lesson plans, quizzes, and tests.

Professional Activity

PUBLICATIONS (REFEREED)

- Billings, E. (2012). Chapter 3. Ratios, Rate, and Proportional Relationships: Problems that Encourage Proportion Sense. In Glenda Lappan (Ed.), Rich and Engaging Mathematical Tasks: Grades 5-9. (pp. 90-94). Reston, VA: National Council of Teachers of Mathematics.
- Coffey, David & Billings, E. (December 2008/January 2009). Teachers as Lifelong Learners—The Role of Reading. Teaching Children Mathematics, 15(5), 267-274.
- Billings, E. (2008). Exploring Generalization through Growth Patterns. In C. Greenes and R. Rubenstein (eds.) NCTM 70th Yearbook (2008): Algebra and Algebraic Thinking in School Mathematics (pp. 279-294), Reston, VA: The National Council of Teachers of Mathematics.
- Billings, E., Tiedt, T., and Slater, L. (December 2007/January 2008). Algebraic Thinking and Pictorial Growth Patterns. Teaching Children Mathematics 14 (5) 302-308.
- Billings, E., Beckmann, C. (May 2005). Children's Literature: A Motivating Context to Explore Linear and Exponential Functions. Mathematics Teaching in the Middle School, 10 (9), 470-478.
- Schultz, M. & Billings, E. (March 2005). Mailing a Publication: An Activity that Promotes an Understanding of Step & Linear Functions. Mathematics Teaching in the Middle School, 10 (7), 349-355.
- Billings, E., Schlicker, S., Novotny, K., & Tefera, A. (September 2004). Enhancing Core Mathematics Courses. PRIMUS, 14 (3), 230-252.
- Beckmann, C., & Billings, E. (August 2004). Figuring Fitness: Nutrition in the Middle Grades. Mathematics Teaching in the Middle School, 10 (1), 46-53.
- Beckmann, C., Wells, P., Gabrosek, J., Billings, E., Aboufadel, E., Austin, D., Champion, A., Curtiss, P., & Dickinson, W. (2004). Enhancing the Mathematical Understanding of Prospective K-12 Teachers through Infusion of Standards-Based K-12 Curricula. In R. Rubenstein and G. Bright (eds.) Perspectives on the Teaching of Mathematics 2004 Yearbook (pp. 151-163) Reston, VA: The National Council of Teachers of Mathematics.
- Billings, E., & Lakatos, T. (May 2003). Lisa's lemonade stand: Exploring algebraic ideas. Mathematics Teaching in the Middle School, 8 (9), 456-460.
- Billings, E. (Summer 2002) Assessing two preservice elementary school teachers' views of qualitative-based mathematical reasoning. Focus on Learning Problems in Mathematics, 24 (3), 17-36.
- Billings, E. (2001). Problems that encourage proportion sense. Mathematics Teaching in the Middle School, 7 (1), 10-14.
- Billings, E., & Klanderma, D. (2000). Graphical representations of speed: Obstacles preservice K-8 teachers experience. School Science and Mathematics, 100, (8). 440-450.

CURRICULUM-ACTIVITY PUBLICATIONS (REFEREED)

- Billings, E. (2012). Chapter 3. Ratios, Rate, and Proportional Relationships: Cocoa: Teaching Notes. In Glenda Lappan (Ed.), Rich and Engaging Mathematical Tasks: Grades 5-9. (pp. 97-99). Reston, VA: National Council of Teachers of Mathematics.
- Billings, E. (2012). Chapter 3. Ratios, Rate, and Proportional Relationships: Numbers Need Not Apply: Teaching Notes. In Glenda Lappan (Ed.), Rich and Engaging Mathematical Tasks: Grades 5-9. (pp. 95-96). Reston, VA: National Council of Teachers of Mathematics.
- Billings, E. (2012). Tic Tac Row. In E. Billings (Ed.) Adventures with Mathematics: Climbing from Grade 2 to Grade 3 (pp. 6-8). Michigan Council of Teachers of Mathematics.
- Wischmeyer, L., Sochacki, R., and Billings, E. (2012). Measurement Detective. In E. Billings (Ed.) Adventures with

Mathematics: Climbing from Grade 2 to Grade 3 (p. 43). Michigan Council of Teachers of Mathematics.

Billings, E. (2002). Numbers need not apply. In G. Bright & B. Litwiller (Eds.) Classroom Activities for Making Sense of Fractions, Ratios, and Proportions 2002 Yearbook (pp. 36-37). Reston, VA: National Council of Teachers of Mathematics.

Billings, E. (2002). Cocoa. In G. Bright & B. Litwiller (Eds.) Classroom Activities for Making Sense of Fractions, Ratios, and Proportions 2002 Yearbook (pp. 38-40). Reston, VA: National Council of Teachers of Mathematics.

CONFERENCE PROCEEDINGS

Kasmer, L. & Billings, E. (August 2011). *Prediction Questions in the Elementary Classroom*. In Proceedings of the International Symposium of Elementary Mathematics Teaching (SEMT '11). Charles University, Faculty of Education: Prague, Czech Republic.

Beckmann, C., Billings, E., & Dogru, F. (2006). Enhancing the Teaching of Undergraduate Geometry Using K–12 Resources. Proceedings of the 3rd International Conference on the Teaching of Mathematics at the Undergraduate Level. Istanbul, Turkey: Turkish Mathematical Association.

Billings, E., & Klanderma, D. (2000). What constitutes a mathematically rich and meaningful task: Preservice elementary school teachers' perceptions. In M. Fernandez (Ed.), Proceedings of the 22nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (pp. 641-645). Columbus, OH: ERIC Clearing House.

Billings, E., Shroyer, J., & Wells, P. (2000). A Tutoring field experience as a vehicle for applying authentic knowledge and pedagogy: Dilemmas and successes. In Proceedings of the 4th Annual Meeting of the Association of Mathematics Teacher Educators, <http://www.ceemast.csupomona.edu/amte/conference/2000/proceedings/index.html>

EDITOR

- Lead Editor: *Adventures with Mathematics: Climbing from Kindergarten to Grade 1* (in press)
- Lead Editor: *Adventures with Mathematics: Climbing from Grade 2 to Grade 3: Michigan Mathematics Activity Book Series*, Michigan Council of Teachers of Mathematics, February 2012.
- Lead Editor: *Adventures with Mathematics: Climbing from Grade 3 to Grade 4* (in press)
- Co-Editor, *Adventures with Mathematics: Climbing from Algebra I to Geometry: Michigan Mathematics Activity Book Series*, Michigan Council of Teachers of Mathematics, 2010.
- Co-editor, *Menu of Problems, Mathematics Teaching in the Middle School* (2000-2001)

REVIEWER/REFEREE

- I reviewed the text *Teaching and Learning Mathematics in the Middle School* for mathematical accuracy for Key College Publishing (this took approximately 25 hours) – March 2003
- I reviewed the *Teaching and Learning Mathematics in the Middle School Instructor's Resource Manual* for mathematical accuracy for Key College Publishing (this took approximately 35 hours) -- September–October 2003
- I reviewed 3-5 manuscripts per year for the journal *School Science and Mathematics* (2001-2005)
- I referee 1-4 manuscripts per year for the journal *Mathematics Teaching in the Middle School* (2002-2007; 2010-present)
- I referee 2-4 manuscripts per year for the journal *Teaching Children Mathematics* (2002-present)
- I review manuscripts (when asked) for the journal *FOCUS on Learning Problems in Mathematics* (2002-2004)

PRESENTATIONS—NATIONAL ORGANIZATIONS (REFEREED PROCESS)

Billings, E., Veldkamp, D., and Sheppard, S. (April 27, 2012). *Using Ten Frames to Promote Number Sense*. Annual Conference of the National Council of Teachers of Mathematics, Philadelphia, PA.

Veldkamp, D., Billings, E., and Wischmeyer, L. (April 26, 2012). *Using Math Games to Encourage Learning and Differentiate Learning*. Annual Conference of the National Council of Teachers of Mathematics, Philadelphia, PA.

Billings, E. and Kasmer, L. (February 2012). *Using Prediction Questions as a Vehicle for Professional Development*. Annual Conference of the Association of Mathematics Teacher Educators: Fort Worth, TX.

Kasmer, L. & Billings, E. (August 2011). *Using Prediction Questions as a Vehicle for Professional Development: A Pilot*

- Study. Bi-annual International Symposium of Elementary Mathematics Teaching (SEMT). Prague, Czech Republic.*
- Billings, E., Zehnder, D., & Tompsett, K. (April 2011). Developing Mathematics Rtl to Improve Students' Understanding of Number. Annual National Council of Teachers of Mathematics Conference. Indianapolis, IN.
- Coffey, D., Billings, E., and Scott, M. (April 2011). Developing Teachers' Algebraic Reasoning through Job-Embedded Professional Development. Annual National Council of Teachers of Mathematics Conference. Indianapolis, IN.
- Billings, E., Coffey, D., Golden, J. (May 2010). How the Workshop Model Helps College Students Take Responsibility for Their Learning. Scholarship of Teaching and Learning 2010 Academy Conference. Eastern Michigan University: Ypsilanti, MI.
- Billings, E. & Coffey, D. (January 2008). Connecting "Best Practices" in Language Arts and Mathematics Instruction. 12th Annual Conference of the Association of Mathematics Teacher Educators: Tulsa, OK.
- Wells, P., & Billings, E. (March 2007). Deepening Preservice Teachers' Content and Pedagogical Content Knowledge. 85th Annual Conference of the National Council of Teachers of Mathematics: Atlanta, GA.
- Billings, E., & Beckmann, C. (March 2007). Children's Literature: A Motivating Context to Explore Functions. 85th Annual Conference of the National Council of Teachers of Mathematics: Atlanta, GA.
- Billings, E., Coffey, D., Golden, J. (January 2007) Professional Development from the Perspective of a Community of Practice. 11th Annual Conference of the Association of Mathematics Teacher Educators: Irvine, TX.
- Wells, P. & Billings, E. (January 2007) Using reform-based curricula to deepen prospective elementary school teachers' content and pedagogical content knowledge. 11th Annual Conference of the Association of Mathematics Teacher Educators: Irvine, TX.
- Billings, E., & Tiedt, T. (April 2006). Using Pictorial Growth Patterns to Build Algebraic Thinking. 84th Annual Conference of the National Council of Teachers of Mathematics: St. Louis, MO.
- Billings, E., Coffey, D., Wells, P., Yu, P., Bergeon, R., McCarthy, T., & Roy, J. (January 2005) Helping Prospective Teachers Develop Reflective Habits of Mind: Laying the Foundation for Becoming Teacher Leaders. 9th Annual Conference of the Association of Mathematics Teacher Educators: Dallas, TX.
- Billings, E., & Coffey, D. (April 2004). What the Heck is a Rekenrek? A Tool for Exploring Whole-Number Computation. 82nd Annual Conference of the National Council of Teachers of Mathematics: Philadelphia, PA.
- Billings, E. & Schultz, M. (April 2003). Postal Rates: Middle Schoolers Explore Functions through a Real-world Context. 81st Annual Meeting of the National Council of Teachers of Mathematics: San Antonio, TX.
- Wells, P., Shroyer, J., & Billings, E. (Jan 2002). Using cases to enhance elementary school preservice teacher's content and pedagogical knowledge. 6th Annual Conference of the Association of Mathematics Teacher Educators: San Antonio, TX.
- Billings, E. & Klanderma, D. (October, 2000). What constitutes a mathematically rich and meaningful task: Preservice elementary school teachers' perceptions. 22th Annual Meeting of the PME-NA (Psychology of Mathematics Education—North America): Tucson, AZ.
- Billings, E. & Klanderma, D. (September, 2000). What does this speed graph mean anyway? Difficulties and misconceptions college students experience in the construction and interpretation of graphical representations of functions. 5th Annual Conference on Research in Undergraduate Mathematics Education: Chicago, IL.
- Billings, E. & Klanderma, D. (March, 2000). What makes a good mathematical problem? Perceptions and cognitive change in preservice elementary school teachers. 27th Annual Meeting of the Research Council on Mathematics Learning: Las Vegas, NV.
- Billings, E., Shroyer, J., & Wells, P. (February, 2000). A tutoring field experience as a vehicle for applying arithmetic knowledge and pedagogy: Dilemmas and successes. 4th Annual Meeting of the Association of Mathematics Teacher Educators: Charlotte, NC.
- Klein, G., Billings, E., & Meyering, R. (1999). CBLs for novices: Experiments, data analysis, and pedagogy. Workshop presented at the 77th National Council of Teachers of Mathematics Meeting: San Francisco, CA.
- Khoury, H., Steele, D., Billings, E., Hines, E., Thrun, J. (1998). A study of teacher learning about mathematics teaching through interactions with other teachers and teacher educators. Paper presented at 76th National Council of Teachers of Mathematics Meeting, Washington DC.
- Zollman, A. & Billings, E. (1997) Assimilating alternative assessment in the daily mathematics classroom. Workshop presentation conducted at the 75th National Council of Teachers of Mathematics Meeting, Minneapolis, MN.

PRESENTATIONS—STATE & LOCAL ORGANIZATIONS

- Billings, E., Phillips, L., Sochacki, R., Veldkamp, D., Wischmeyer, L., (August 2011). Adventures with Mathematics: K-2. Michigan Council of Teachers of Mathematics Annual Conference. Macomb, MI.
- Billings, E. & Wells, P. (February 5, 2011). Searching for Patterns to Generalize Percent and Ratio Word Problems. Math in Action Conference: Grand Valley State University.
- Billings, E. Hollenbeck, C., Lesiewicz, M., Phillips, L., Sheppard, S., Sochacki, R., Veldkamp, D., Whaley, L., Wischmeyer, L., Ziebart, R.. (February 5, 2011). Adventures with Mathematics: Grades K-2. Math in Action Conference: Grand Valley State University.
- Billings, E., Coffey, D., and Golden, J. (March 16, 2010). Workshop Model: What's with all the Workshop Worksheets? Mathematics Department Seminar. Grand Valley State University.
- Coffey, D., Golden, J. & Billings, E. (April 2, 2009). From Learned Helplessness to Independence: Helping Students Take Responsibility for their Reading. Pew Faculty Teaching and Learning Center 2 hour Workshop. Grand Valley State University.
- Billings, E., Coffey, D., & Golden, J. (March 14, 2009) Building Bridges: Using the Workshop Model to Promote Mathematical Literacy. Michigan Reading Association Conference, Grand Rapids, MI.
- Coffey, D., Billings, E., and Golden J. (August 2008). From Learned Helplessness to Independence: Helping College Students Take Responsibility for Their Learning. Pew Faculty Teaching and Learning Fall Teaching and Learning Conference. Grand Valley State University, Allendale, MI.
- Coffey, D., Golden, J., and Billings, E. (August 7, 2008) Mathing Workshop. 59th Annual Conference of the Michigan Council of Teachers of Mathematics. Holt, MI.
- Billings, E. & Coffey, D. (February 2008). Making Meaning through Problem-Solving. Annual Math in Action Conference: Eberhard Center at Grand Valley State University, Grand Rapids, MI.
- Billings, E. (April 17, 2007). Building Mathematical Teacher (K-8) through Professional Development. Poster session for the GVSU College of Liberal Arts and Sciences Sabbatical Showcase.
- Billings, E. (February 2007) Practice-Based Professional Development and Communities of Practice. Mathematics Department Seminar, Grand Valley State University.
- Rumohr-Voskuil, G. & Billings, E. &. (February 2007). Ways to Incorporate Best-Practice Language Arts Methods in the Math Classroom. Annual Math in Action Conference: Eberhard Center at Grand Valley State University, Grand Rapids, MI.
- Billings, E. (November 2006). Ways We Use Writing to Facilitate and Deepen Mathematical Communication. Mathematics Department Seminar, Grand Valley State University.
- Billings, E., & Beckmann, C. (August 2006). Children's Literature: A Motivating Context to Explore Functions. 57th Annual Conference of the Michigan Council of Teachers of Mathematics: Holt, MI.
- Billings, E., & Beckmann, C. (February 23, 2006). A Motivating Context to Explore Functions. Annual Math in Action Conference: Eberhard Center at Grand Valley State University, Grand Rapids, MI.
- Billings, E., Tiedt, T., & Slater, L. (October 2005). Using Pictorial Growth Patterns to Promote Algebraic Thinking. 56th Annual Conference of the Michigan Council of Teachers of Mathematics: Grand Rapids, MI.
- Billings, E., & Bergeon, R. (October 2005). Using Pictorial Growth Patterns to Explore Exponential Relationships in the Middle School Classroom. 56th Annual Conference of the Michigan Council of Teachers of Mathematics: Grand Rapids, MI.
- Billings, E., Bergeon, R., McCarthy, T., and Slater, L. (February 24, 2005). Using Pictorial Growth Patterns to Promote Algebra in Elementary and Middle Grades Classrooms. Annual Math in Action Conference: Eberhard Center at Grand Valley State University, Grand Rapids, MI.
- Billings, E., Novotny, K., and Schlicker, S. (October 2004). Middle School and High School Topics That Lay the Foundation for Studying Abstract Algebra in College. 55th Annual Conference of the Michigan Council of Teachers of Mathematics: Detroit, MI.
- Billings, E., Novotny, K., & Schlicker, S. (March 2004) Enhancing Abstract Algebra. Conversations Among Colleagues. Grand Valley State University: Grand Rapids, MI.
- Billings E., & Wells, P. (October 2003). Activities that Help Students Explore the Concept of Prime Numbers. 54th

- Annual Conference of the Michigan Council of Teachers of Mathematics: Lansing, MI.
- Billings E. (October 2003). Panel Presenter: A Collage of Collaboration. 1st Annual Michigan Association of Mathematics Teacher Educators: Lansing, MI.
- Billings, E. & Schultz, M. (March 2003). Postal Rates: Middle Schoolers Explore Functions through a Real-world Context. Annual Math in Action Conference: Eberhard Center at Grand Valley State University, Grand Rapids, MI.
- Billings E., & Schultz, M. (October 2002). Mailing a Publication: An Investigation of Middle School Students' Understanding of Step and Linear Functions. 53rd Annual Conference of the Michigan Council of Teachers of Mathematics: Marquette, MI.
- Billings, E., & Wells, P. (Feb 2002). Activities that help students explore the concept of prime numbers. Annual Math in Action conference: Eberhard Center at Grand Valley State University, Grand Rapids, MI.
- Beckman, C. & Billings, E. (October 2001). Figuring Fitness: Healthy Math for Middle Schoolers. 52nd Annual Conference of the Michigan Council of Teachers of Mathematics: Grand Rapids, MI.
- Billings, E. & Klanderma, D. (May 2001). College students' misconceptions of the graphical representations of speed. Association of Christians in the Mathematical Sciences, Calvin College: Grand Rapids, MI.
- Billings, E., Shroyer, J., & Wells, P. (April 2001). Using case studies to help prepare preservice elementary teachers for a tutoring field experience. Department of Mathematics and Statistics seminar talk, Grand Valley State University: Allendale, MI.
- Billings, E. & Golden, J. (November, 2000). "Rich" problems to encourage informal geometric reasoning. Math and Science Update, Grand Valley State University: Allendale, MI.
- Billings, E., & Klanderma, D. (September, 2000). What does this speed graph mean anyway? Obstacles preservice teachers experience as they interpret graphical representations of functions. Paper presented at the 10th annual meeting of the Illinois/Northwest Indiana seminar on mathematics education, DeKalb, IL.
- Billings, E. (March 2000). Exploring problems to promote proportional reasoning. The 30th Annual MAMSE (Michigan Association of Middle School Educators) Conference: Grand Rapids, MI.
- Billings, E. & Golden, J. (November, 1999). Math as a bad penny: A modeling excursion for exponential functions. Math and Science Update, Grand Valley State University: Allendale, MI.
- Billings, E. (1999). Exploring an often ignored aspect of mathematical reasoning. Department of Mathematics and Statistics colloquium talk, Grand Valley State University: Allendale, MI.
- Billings, E. (1999). Exploring fractions via stained glass. Workshop conducted at Mathematics in Action, Grand Valley State University: Allendale, MI.
- Billings, E. (1998). Painted cubes patterns. Workshop conducted at Math and Science Update, Grand Valley State University: Allendale, MI.
- Billings, E. (1997). Qualitative-based reasoning among preservice elementary school teachers in proportionalsituations. Paper presented at the 5th annual meeting of the Illinois/Northwest Indiana seminar on mathematics education, DeKalb, IL.
- Billings, E. (1997). Pattern Blocks: Area, Perimeter and Proportions. Workshop conducted at the Mathematics Manipulative Workshop, Northern Illinois University, DeKalb, IL.
- Khoury, H., Hines, E., & Billings, E. (1996). The MRL project: Implementing mathematics reform. Symposium conducted at the 1st annual Illinois Scientific Literacy Network Conference, Aurora, IL.

CONFERENCES/WORKSHOPS ATTENDED (BUT DID NOT PRESENT)

- 2010 Ninth Annual Lesson Study Conference: Are We Doing Lesson Study Right? (April 29-30, 2010). DePaul University, Chicago.
- Teaching Portfolio Workshop, May 17-20, 2004, Pew Faculty Teaching and Learning Center, Grand Valley State University, Allendale MI.
- Show Me Conference 2001. St Louis, MO.
- Faculty Teaching and Learning Conference, August 22, 2001, Grand Valley State University Allendale MI.
- Faculty Teaching and Learning Conference, August 25, 1999, Grand Valley State University Allendale MI.
- Improving Teaching and Learning Through Assessment: A Seminar for Methods Course Leaders. Michigan State University, Dept of Teacher Education, August 19, 1999, E. Lansing, MI.

- Leadership Conference. University of Michigan (School of Education), February 5, 1999, Ann Arbor, MI.
- Faculty Teaching and Learning Conference, January 7, 1999, Grand Valley State University Allendale MI.
- 49th Annual Michigan Council of Teachers of Mathematics Conference, October, 1998, Lansing, MI.

PROFESSIONAL DEVELOPMENT FOR TEACHERS AND MATH ENRICHMENT FOR K-8 CHILDREN Educators' Mathematics Content Collaborative (E=MC²) (April 2010-September 2011)

Michigan Department of Education Grant -- Math Content Coordinator

Title 2 Michigan Department of Education \$200,000 grant promoting partnership among the GVSU College of Education and Mathematics Department and area districts providing 90 hours of GLCE-based, content-rich mathematics professional development enabling participants to become Highly Qualified in teaching mathematics. I have co-planned and co-facilitated the majority of the math content workshop sessions for this grant (with a focus on algebraic thinking).

Leading/Co-Leading 18-hour BCC Workshops for Elementary Teachers (Fall 2008)

Exploring Whole Numbers and Operations through Problem Solving and Representations

These 18 hours worth of workshops, offered through the Regional Math and Science Center at GVSU as part of the Building Confidence through Content series, were designed to enhance K-5 teachers' ability to problem-solve and represent thinking in the context of whole numbers and operations, especially in light of the Michigan Grade Level Content Expectations (GLCEs). I co-created and co-facilitated these the workshops with Dr. Pam Wells.

Leading/Co-Leading 18-hour BML Workshops for Elementary Teachers (2005)

Rational Numbers—summer 2005 Algebra Concepts 1—summer 2005 Algebra Concepts 2—fall 2005

These workshops, offered through the Regional Math and Science Center at GVSU as part of the Building Mathematics Leaders Grant, were designed to enhance K-5 teachers' mathematical content knowledge especially in light of the Michigan Grade Level Content Expectations (GLCEs). I co-taught the summer workshops with Dr. Pam Wells.

Educational Consulting: Long Term Professional Development of Elementary Teachers

Stepping Stones Montessori School (Fall 2009-Winter 2010)

(volunteer, no educational consulting fees)

I worked with teachers to identify mathematical goals, align Montessori Curriculum with GLCEs, design activities to "bridge" any gaps in the curriculum, and explore ways to enhance instruction/student learning in number and operations and geometry.

- 2 half-day Inservice PD Days with full staff (Fall 2009)
- 15 hours of after School PD: I meet with two different groups of teachers approximately once a month after school for 1-2 hours each session (preschool-kindergarten and grades 1-6 teachers)

Mason-Lake Intermediate School District (Fall 2008-Winter 2009)

Along with Drs. John Golden and David Coffey, we provided three-four full days of mathematical professional development for the each of the 3rd, 4th, and 5th grade teachers who teach in this ISD (for a total of 11 professional development days throughout the school year). I co-facilitated eight days of PD. The focus of this professional development was to enhance teachers' mathematical understanding and instructional strategies based on the main curriculum focal points (as presented by the National Council of Teachers of Mathematics).

Lakeview Elementary School, Lakeview School District (Fall 2005-Winter 2010)

Bright Start Elementary School, Lakeview Community Schools (Fall 2009-Winter 2010)

I am continuing on-going professional development for the teachers in this building (initiated in Fall 2005). This year (2009-2010)I worked with the teachers during 4 inservice days (full day PD) to identify and design "interventions" to help children who are falling behind and not meeting mathematical proficiency as outlined in the GLCEs.

Bright Start Elementary School, Lakeview School District (Fall 2006-Winter 2008)

In Fall 2006, Bright Start Elementary School hired me as an educational consultant to continue on-going professional development with teachers begun during my sabbatical project. In this capacity, I have provided 8 full days and 2 half days of professional development. Teachers chose the focus for their professional development; topics included problem-solving, questioning, estimation, place-value, fact knowledge, and addition and subtraction of multi-digit numbers. I met with all the teachers at a particular grade level (preK and K were combined) for a 3 – 3 ½ hour workshop, so on full days I met with two different groups of teachers. Since I have worked with this school over a 2 ½ year span, I spend a lot of time preparing new material that builds upon what we have done in the past. (I spend at least as much time prepping as I do in facilitating the PD workshops).

Bright Start Elementary School, Lakeview School District (Fall 2005-Winter 2006)

I worked formally with Lakeview Elementary School and Bright Start Elementary School during the 2005-6 school year as part of a sabbatical project. I observed almost every teacher teach in his/her classroom and worked in conjunction with the principals at each school to develop grade-level professional development opportunities. Professional development occurred during school hours and at the school building (substitute teachers were hired to cover the teachers' classes while the professional development occurs) and included: deepening mathematical content of topics taught at that grade level, implementation and understanding of the GLCEs, ways to implement curriculum and make connections between mathematical topics, and developing best teaching practices such as questioning techniques. I worked with four different groups of teachers: pre-Kindergarten-Kindergarten, first grade, second grade, and fifth grade. I spent approximately five days observing teachers teach, and the remaining twelve days facilitating practice-based professional development with two groups of teachers per day, meeting with each group approximately three hours. Common, overall themes I explored with all the groups included: heightening each teacher's awareness of his/her actions in the classroom, practicing the discipline of reflecting about teaching, and co-creating a community of practice.

Individual Teacher Workshops

Martin Luther King, Jr. Elementary School, Muskegon Heights, MI

Billings, E. (October 28, 2011). K-1 Math Intervention: Mathematics Professional Development for Paraprofessionals (exploring strategies for increasing children's understanding of number and addition/subtraction facts). I planned and facilitated this hands-on, interactive full-day hour workshop (6 hrs). *Funded through the Michigan Space Grant Consortium (Dr. Char Beckmann, PI)*

Building Mathematics Leaders (BML) Grant Workshop, Regional Math and Science Center, GVSU

Billings, E. (February 9, 2006). Problem Solving Approach to Mathematics. Workshop Co-planned with Karen Meyers of the RMSC. I co-facilitated 3 ½ hours of this in-service professional development workshop for teachers participating in the BML grant.

West Olive Christian Schools (W. Olive, MI)

Billings, E. (October 21, 2005). Patterns and Algebraic Thinking in Grades K-8. Interactive three hour in-service professional development workshop for entire staff at West Olive Christian Elementary School.

Lakeview Public Schools (Lakeview, MI)

Billings E. (October 17, 2005). Graphing in the Upper Elementary Grades. Interactive three hour ins-service professional development workshop for entire staff at Lakeview Elementary School.

Billings, E. (October 17, 2005). Number Sense and Number Operations for Students in PreK- Grade 2. Interactive three-hour professional development workshop for entire staff at Brightstar Elementary School.

Billings, E. (March 16, 2005 and March 23, 2005)

I led two full-days of professional development in-service days for the 3rd, 4th, and 5th grade teachers at Lakeview Elementary School. I met with each group of teachers for 4 hours and we explored geometric topics to deepen mathematical content knowledge and to connect these topics with the GLCEs. We also discussed pedagogical issues of what effective mathematics instruction looks like. I also met with the math curriculum team for a 3 hour session to discuss their school math goals and further discuss effective mathematics instruction.

Allendale Public Schools – Allendale Elementary School

Billings, E. and Wells, P. (April 13, 2004). Helping Young Children Understand and Apply Place Value Concepts. Interactive one hour in-service workshop presented to 28 kindergarten - second grade teachers at Allendale Elementary School.

Grand Rapids Public Schools – Southwest Community Campus – March 10, 2004

Billings, E. and Wells, P. (March 10, 2004). Addition and Subtraction Fact Strategies. Interactive in-service workshop presented to second grade teachers at Southwest Community Campus.

Parents in Allendale Teaching Children at Home (PATCH)

Billings, E. and Wells, P. (May 5, 2003). Developing Children's Number Sense and Computational Fluency. Interactive workshop presented to PATCH.

Math Enrichment Lessons for K-8 Students

The Potters House: Grand Rapids, MI Grades 7-8: May 2010

I taught Algebra for 2 days and all of the math classes of one teacher while she was on sick leave. This teacher plans to participate is a participant in the E=MC² grant.

Stepping Stones Montessori School: Grand Rapids, MI

Grade 5: Spring 2011

I planned and facilitated 4 hands-on, problem-solving based geometry lessons. Each lesson lasted 45min-1hour.

Grades 4-6: November-December 2006

I planned and led a 2-hour enrichment with 32 students in grades 4-6, exploring median and data collection. I also coordinated an integrated math-art unit exploring patterns and algebraic thinking. Ten of my MTH 324 students facilitated a math lesson I had written, working with small groups of student, in this upper elementary classroom.

Grades 2-3: November-December 2006

I led weekly 1 ½ - 2 hour math enrichment classes in the primary classroom, working with students in grades 2 and 3 and exploring place-value concepts through mathematics games.

Grade 3: January 2005 – May 2005

I led weekly 1 ½ - 2 hour math enrichment classes in the primary classroom and worked exclusively with students in grade 3. I taught the third graders and created and led activities that promoted an understanding of multiplication, division, fractions, and connections to geometry.

Grades 1-3: March 2003; February 2004 – May 2004

I led weekly math enrichments in the multi-grade primary classroom (grades 1-3). We broke the class into 4 groups; two groups of first graders, one group of second graders, and one group of third graders. I worked with each group of students every other week (first graders one week and second and third graders the following week) and created and led activities that promoted the use of strategies for adding whole numbers.

Grade 6: November 2001

I taught a 1½ hour interactive lesson, Walk the Graph, a CBR exploration used to analyze and interpret graph, with the 6th graders.

GRANTS

Educators' Mathematics Content Collaborative (Spring 2010-Summer 2011) – Math Content Specialist

This is a Title 2 Michigan Department of Education grant (approximately \$200,000); a joint collaboration between the College of Education and the College of Education. I am serving as math content coordinator; planning and facilitating mathematical content instruction with colleagues Pam Wells and John Golden.

This project is professional development intervention that targets middle school special education teachers and their mathematics-endorsed regular education teaching colleagues in a high poverty district, two suburban districts as well as private schools in high-poverty districts. Each school has a significant number of teachers who are teaching math without a math major or minor, and each school has struggled with increasing math achievement among students with disabilities.

This project provides 90 hours of content-rich professional development. It incorporates selected Michigan Mathematics Focal Points and Grade Level Content Expectations, "best practices" in math instruction, universal designs for learning, learning communities, and assessment and differentiation strategies to increase content achievement of underrepresented leaders in mathematics.

Building Mathematical Leaders (BML) Grant -- Member of Management Team (Fall 2004-Spring 2006)

The Regional Mathematics and Science Center (RMSC) received an \$183,000 Improving Teacher Quality Grant from the Michigan Department of Education for the project *Building Mathematical Teachers (BML)*. I am a member of the management team of this grant.

This project is an in-depth two-year program (starting Fall 2004) that will support and equip K-8 teachers in a high-needs district (Grand Rapids) to become effective mathematics teacher leaders in their buildings. Approximately 30 mathematics teachers will participate in the project, recruited from Iroquois Middle School, Northeast Middle School, each middle school's feeder elementary schools, and other private and non-profit schools in this geographic attendance area. This project will include workshops as well as on-going professional opportunities to increase teacher content knowledge in mathematics, improve the quality of mathematics instruction in these schools, and increase students' mathematics performance on state assessments. Teachers who participate in the grant are expected to become the "mathematics person" in their school building. Also, they will help to lead their school in mathematics curriculum alignment and development with Michigan's newly formed Grade Level Content Expectations (GLCE), which are assessment standards that will form the basis for the yearly Michigan mathematics testing (MEAP) in Grades 3-8 as mandated by the No Child Left Behind (NCLB) legislation. Participation in the project provided opportunities for teachers to meet the NCLB highly qualified teacher requirements. The project fostered relationships among these teacher leaders, their building principals, and those who support them. It promoted discussion among colleagues around mathematics content and pedagogy issues.

Instructor for BML Math Content Workshop for Elementary Teachers (Fall 2005)

I taught a 17.5 hour workshops (Algebra Concepts 2) that could be taken as a SB-CEU or for graduate credit during the fall of 2005 to enhance K-5 teachers' mathematical content knowledge.

Co-Instructor for Two BML Math Content Workshops for Elementary Teachers (Summer 2005)

Along with Pam Wells, I taught 2 different 18 hour workshops (Rational Numbers and Algebra Concepts 1) that could be taken as a SB-CEU or for graduate credit during the summer 2005 to enhance K-5 teachers' mathematical content knowledge. For each workshop, teachers met with us for 18 contact hours.

Integrating Content and Pedagogy (Spring 2003)

This \$3000 grant was awarded by Dean Kindschi to support writing teaching notes and instructional materials for all of the 221 materials currently used in the teaching of the course. Along with Pam Wells, we wrote teaching notes for over 100 activities, identified mathematical goals for all of the activities, and organized these materials into a user-friendly instructor notebook.

Enhancing the Core--Faculty Teaching & Learning Center Pew Scholar Teacher Grant--Participant (Spring 2002)

Enhancing the Mathematical Core is a multi-part multi-year project in which mathematicians, statisticians, and mathematics educators work together to extend and enhance the curriculum in the core content courses (that all mathematics majors who are prospective teachers at Grand Valley take) in order to increase the teaching effectiveness in these courses. In particular, we use the National Science Foundation (NSF) supported K-12 curricula projects and other National Council of Teachers of Mathematics (NCTM) standards-based materials to find and create activities to incorporate in these courses to help introduce, explore, and extend the courses' core mathematical concepts. In order to incorporate examples from exemplary K-12 mathematics curricula into these core courses, we first determined how the course aligns with current national standards (NCATE, NCTM, and CBMS-MET). After establishing the core concepts of each course, we determined which topics were most likely to be enhanced through the use of exemplary K-12 material. Then we found, adapted, or created mathematics

curricula accordingly. I was a member who worked to enhance our abstract algebra course (Math 310) at GVSU.

Undergraduate Research Grant – Dean’s Office (Science & Mathematics) (Spring/Summer 2002)

This grant was awarded to encourage research collaboration between undergraduates and faculty at GVSU. I worked with a student, Melanie Schultz. The goals of this research project were two-fold. First we created exemplary elementary and middle school curriculum that incorporates the NCTM Principles and Standards for School Mathematics and research on the learning of algebraic concepts. In particular, we developed activities/tasks that will enable elementary and middle school students to identify, interpret, extend, and generalize patterns so that they may understand the underlying (functional) relationships between variables and deepen their ability to reason algebraically. Second, we investigated the strategies that elementary and middle school students’ use to analyze, extend, and generalize patterns to elicit functional relationships that arise in various real-world contexts. In addition, we investigated the types of connections that middle school students make between multiple representations of functions (tables, graphs, verbal descriptions of the generalized relationships, and symbolic equations).

Teaching Circle Grants – Pew Faculty Teaching and Learning Center (Fall 2000 - Winter 2007)

This grant is given to encourage faculty dialogue on teaching-related subjects. I organized a departmental discussion group that has examined Liping Ma’s book *Knowing and Teaching Elementary Mathematics* (Fall 2000), Jo Boaler’s book *Experiencing school mathematics: Teaching styles, sex, and settings* (Winter 2001), the CBMS (Conference Board of the Mathematical Series) monograph, *The Mathematical Education of Teachers* (Winter 2002), and *Multiple Perspectives on Mathematics Teaching and Learning: International Perspectives on Mathematics Education, Volume 1* (Fall 2002) edited by Jo Boaler, *Beyond Formulas in Mathematics and Teaching* by Daniel Chazan (Winter 2004-Fall 2005), and *The Courage to Teach* by Parker Palmer (Fall 2006-Winter 2007). An average of 10 -12 mathematics, mathematics education, and statistics faculty members regularly participated in the discussion each semester. I also co-organized a teaching circle exploring the meaning and uses of models in science and mathematics education (Fall 2006-Winter 2007). Approximately 6-8 mathematics and science educators attend these discussions.

I also wrote and received a teaching circle grant as Math 222 coordinator to encourage Math 222 faculty to dialogue on research related to the material covered in the course. I have organized a discussion group for Math 222 to examine the book edited by Stephen Campbell and Rina Zazkis, *Learning and Teaching Number Theory*.

Teaching Initiative Grant – Pew Faculty Teaching and Learning Center (Summer 2000)

This grant is given to encourage larger-scale teaching and curriculum projects. Along with Drs. Shroyer and Wells, we used this grant to write a tutoring handbook that: outlines the philosophy behind having a 4-week tutoring experience in 2nd and 3rd grade classrooms, details the types of activities that we do to help prepare students for the tutoring experience, and shares ways in which students’ tutoring experiences are assessed. Currently, four of the five chapters are written (approximately 160 pages of text), and one of the appendices is finished. We are finishing up the remaining chapter and have solicited publishers.

MU: Measuring Up: A Middle School Experience -- Research Assistant (Spring & Summer 1997)

This Eisenhower Professional Development Project, directed by Dr. Helen Khoury (Northern Illinois University) was a teacher-enhancement, reform-based project engaged 21 local middle-school teachers in a variety of mathematical problem-solving experiences (based on real-world and school-building-related problems). Algebraic and geometric based thinking was emphasized. I helped plan and lead the various 7 in-service days with a team of 4 other mathematics educators.

MRL: Mathematical Reform Leadership Project -- Research Assistant (Spring 1996)

This was a 2 year project funded by ISBE (Illinois State Board of Education), under the direction of Dr. Helen Khoury, to provide in-depth, reform-based experiences to 50 middle-school mathematics teachers. I participated as a research assistant in the last phase of the project. I *helped plan and lead problem-based activities during six in-service days. Dr. Helen Khoury and I made classroom visitations to all the teachers participating in the project.*

MEMBER OF THE FOLLOWING PROFESSIONAL ORGANIZATIONS:

- AMTE (Association of Mathematics Teacher Educators—current member)
- AERA-SIG/RME (American Educational Research Association - Special Interest Group/Research in Mathematics Education—past member)
- MCTM (Michigan Council of Teachers of Mathematics—current member)
- NCTM (National Council of Teachers of Mathematics—current member)
- RCML (Research Council on Mathematics Learning—past member)
- SSMA(School Science & Mathematics Association—past member)

Unit and University Service

DEPARTMENT CONTRIBUTIONS

Committee Work

Advisory Committee

- Advisory Committee (2001-2005; Winter 2011) duties include: advise chair at weekly meetings, advise chair on salary review of tenure-track and affiliate faculty, review of FAR, evaluation and hiring of affiliate faculty (no longer a duty as of 2011), other ad hoc duties

Affiliate Evaluation Group (Fall 2011-Winter 2012) duties include: review and evaluate affiliate faculty member portfolios and drafting contract renewal reports in consultation with the department chair

Math Department Search Committee

- Search Committee Member (Fall 2008-Winter 2009) duties include: writing search committee ad, training (to promote equity in the process) extensively reading through search committee files, selecting primary and secondary applicant pools, interviewing candidates
- Search Committee Consultant (Winter 2008) duties include: participating in the search committee interview for mathematics education faculty and giving detailed verbal and written feedback for each of the 3 candidates
- Search Committee Consultant (2001-2002) duties include: extensively reviewing files of the mathematics education candidates, giving detailed written feedback to the search committee for each candidate
- Search Committee Member (1999-2000)

Math Department Personnel Committee

- Personnel Committee (2006-2007) duties include: conducting and writing class-visit reports, reviewing candidates' portfolios and other supporting materials, and preparing and initial draft agendas for personnel decisions.

NCATE Assessment Committee

- NCATE Assessment Committee for MTH 324 (2006-2007; 2011-2012) duties include: writing an assessment item and rubric for NCATE purposes

Math in Action

- Mathematics In Action: co-chair (1999-2001) duties: organizing and advertising conference, including setting schedule, reviewing and scheduling presentations. We initiated change of location of conference to Eberhard Center in 2001.
- Steering Committee Member, Mathematics In Action (2001-2002)

Math Department Mentor

- Meet with a newly hired faculty member 2-3 times a month to discuss departmental and university policies and expectations as well as any other questions that arise in the context of teaching and working at GVSU.
 - Fall 2010-Winter 2011: Co-Mentor of Dr. Lisa Kasmer
 - Fall 2001-Winter 2002: Co-Mentor of Dr. Nancy Mack

Other Committee Work:

- Course Coordinator for Math 222 (2002-2004)
- Final Exam Committee for Math 222 (1998-2004) Chair of committee: 2002-2004
- Election Committee (Winter 2004; Winter 2005; Winter 2011)

Mathematics Department Alumni Newsletter-Co-editor (Fall 2008-Winter 2010)

My contributions include: determining format (we switched from paper to on-line newsletter this year), generating topics for articles, gathering information, writing and editing articles. Co-editors: Matt Boelkins and David Austin

Mathematics Education Research Discussion Group (1999-Winter 2007)

I have organized and facilitated various informal discussion reading groups (comprised of mathematicians, mathematics educators, statisticians, and/or science educators), meeting approximately once a month, to discuss current research (articles and books) in mathematics or science education.

UNIVERSITY CONTRIBUTIONS

Committee Work

Research and Development Committee (1999-2001)

Campus Life Committee (Fall 2007—Winter 2009)

Turkey Delegation Team (2/27-3/8 2009) through Padnos International Center

Under to leadership of Dr. Jim Goode, I traveled with an interdisciplinary team of GVSU faculty and staff members to Turkey as part of an International Delegation Team, learning more about the history and culture of Turkey as well as our partner institution, Middle East Technical University (METU)

Host for Visiting Scholar, Dr. Erdinc Cakiroglu, Middle East Technical University (9/21-9/26 2009)

I worked with Liz Smith in PIC to create a schedule for Dr. Cakiroglu's visit to GVSU. I spent approximately 30 hours planning for and hosting Erdinc's visit.

Presentations/Panel Discussions through Pew Faculty Teaching and Learning Center

- Small-group presentation about cooperative groups to Faculty Associate Group at GVSU (February 1999)
- Participant in a Panel Discussion with a Faculty Associate Group (January 2004)

Faculty Mentor for Teaching Portfolio Workshop through Pew Faculty Teaching and Learning Center (Summer 2005, Summer 2007, Spring 2008; Spring 2009; Spring 2012)

I was hired by the Pew FTLC to act as a mentor to two-four faculty members enrolled in a 4-day or 5-day workshop in which they learned about and compiled a teaching portfolio. I participated in panel and group discussions and worked one-on-one with each faculty member each day of the workshop as he/she wrote philosophy of teaching statements and developed and compiled supporting materials for the teaching portfolio. I provided extensive verbal and written feedback for drafts of work submitted.

COMMUNITY SERVICE CONTRIBUTIONS

School Science and Mathematics Association (SSMA) Science and Math Grant Program *Spring 2003*

I have written (in conjunction with Mrs. Amy Schafner of Stepping Stones Montessori School), submitted, and received a \$500 grant to fund the creation of a butterfly, native plant garden at Stepping Stones Montessori School, Grand Rapids, MI. This garden will be used to study the ecosystem and as context for students to explore mathematics (data analysis in particular).

Science is for Girls (November 2001, November 2002) – an all morning workshop for 6th grade girls

In 2001, I wrote and co-led an event that I wrote entitled "Walk the Graph" with Jackie Selleck-Oxford. In 2002 I wrote and led the event by myself.

Michigan Science Olympiad Regional Tournament (March 1999)

Co-coordinator (with John Golden) of the event: "What are you trying to tell me?"

RELATED HONORS

Honored Professor – Alpha Sigma Tau Sorority's 1st Annual Professor Dinner (November 2000)

Each sorority sister chose one professor to honor that had had a positive impact on her life.