Center for the Study of Mathematics Curriculum

Third International Curriculum Conference:

Mathematics Curriculum Development, Delivery, and Enactment in a Digital World

November 7–9, 2014
The University of Chicago
Chicago, IL USA

CONFERENCE PROGRAM
All events take place in Ida Noyes Hall.

Friday, November 7, 2014

8:00 AM – 5:00 PM	**Registration** (Lobby)
8:00 – 9:00 AM	**Continental Breakfast** (Cloister Club)
9:00 AM	**Setting the Stage: demonstrations of digital materials** (Palevsky Cinema) Presider: Robert Reys, University of Missouri
9:00 – 9:20 AM	Hee-chan Lew, Korean National University of Education *Quadratic Curves in a Digital Textbook*
9:20 – 9:40 AM	Christopher Morrison, Pearson Education *CMP3 and the Dash Web Application*
9:40 – 9:50 AM	Break
9:50 – 10:10 AM	Jere Confrey, North Carolina State University *Math Projects*
10:10 – 10:30 AM	Nathalie Sinclair, Simon Fraser University, Canada *TouchCounts: Using Fingers, Eyes and Ears to Learn to Count, Add and Subtract*
10:30 AM	**Refreshments** (Cloister Club)
10:50 AM	**Setting the Stage: demonstrations of digital materials (cont.)** (Palevsky Cinema) Presider: Steven Ziebarth, Western Michigan University
10:50 – 11:10 AM	Michal Yerushalmy, University of Haifa, Israel *Designer Views on the Design of the* VisualMath *e-Textbook*
11:10 – 11:30 AM	Kaye Stacey, University of Melbourne, Australia *Specific Mathematics Assessments that Reveal Thinking (smart tests)*
11:30 – 11:40 AM	Break
11:40 – 12:00 PM	Jean-Marie Laborde, Cabri and University of Grenoble, France *The New* Cabri
12:00 – 12:20 PM	Angela Crouse and Chad Idol, McGraw-Hill Education *Engaging, Efficient, Effective, and Easy to Use Digital Tools from McGraw-Hill Education*

12:20 PM	**Lunch** (Cloister Club)
1:15 PM	**Welcoming Remarks** (Palevsky Cinema) Zalman Usiskin, University of Chicago Barbara Reys, University of Missouri Martin Gartzman, University of Chicago
1:30 PM	**PLENARY SESSION I** (Palevsky Cinema) Presider: Christian Hirsch, Western Michigan University
	Speakers: Mogens Niss, Röskilde University, Denmark *Mathematics Standards and Curricula - Different Notions, Different Meanings, Different Roles in Different Parts of the World under the Influence of Digital Affordances*
	Kenneth Ruthven, University of Cambridge, England *The Re-sourcing Movement in Mathematics Teaching: Some European Initiatives*
3:00 PM	**Break**
3:15 PM	**PLENARY SESSION II** (Palevsky Cinema) Presider: Megan Bates, University of Chicago
	Speakers: Kaye Stacey, University of Melbourne, Australia *Mathematics Curriculum, Assessment and Teaching for Living in the Digital World*
	Michal Yerushalmy, University of Haifa, Israel *Inquiry Curriculum, Textbooks & Assessment: Technological Changes that Challenge the Representation of School Mathematics*
4:45 – 5:30 PM	**Reception** (Lounge/Library)
5:30 – 7:00 PM	**Dinner** (Cloister Club)

Saturday, November 8, 2014

8:00 AM – 4:00 PM	**Registration** (Lobby)
8:00 AM	**Continental Breakfast** (3rd floor Theatre)
8:45 AM	**PLENARY SESSION III** (Palevsky Cinema) Presider: Amanda Thomas, Pennsylvania State University - Harrisburg
	Speakers: Phil Daro, SERP (Strategic Education Research Partnership) and Pearson *Pads in the Classroom: Thinking in Public*
	Jere Confrey, North Carolina State University *Building Digital Curriculum for Students' Productive Struggle Using Challenges, Tools and Interactivity*
10:15 AM	**Refreshments** (3rd floor Theatre)

10:30 AM **PARALLEL PARTICIPANT INTERACTION SESSIONS WITH SPEAKERS**

Session 1 (Palevsky Cinema)
Presider: Martin Gartzman, University of Chicago
Discussion with:
Phil Daro, SERP (Strategic Education Research Partnership) and Pearson
Jere Confrey, North Carolina State University

Session 2 (2nd floor East Lounge)
Presider: Kathryn Chval, University of Missouri - Columbia
Discussion with:
Mogens Niss, Röskilde University, Denmark
Kenneth Ruthven, University of Cambridge, England

Session 3 (2nd floor West Lounge)
Presider: Betty Phillips, Michigan State University
Discussion with:
Kaye Stacey, University of Melbourne, Australia
Michal Yerushalmy, University of Haifa, Israel

11:30 AM **Lunch** (3rd floor Theatre and 1st floor Library/Lounge)

12:30 PM **PANEL: RESEARCH ON DIGITAL CURRICULA** (Palevsky Cinema)

Jeffrey Choppin, University of Rochester (Moderator)
A Typology for Analyzing Digital Curricula in Mathematics Education

A.J. Edson, Michigan State University
A Design Experiment of a Deeply Digital Instructional Unit and Its Impact in High School Classrooms

Janine Remillard, University of Pennsylvania
Keeping an Eye on the Teacher in the Digital Curriculum Race

Nathalie Sinclair, Simon Fraser University, Canada
New Starting Points for Number Sense Using TouchCounts

2:00 PM **Break**

2:15 PM **PLENARY SESSION IV** (Palevsky Cinema)
Presider: Andy Isaacs, University of Chicago

Speakers:
Jean-Marie Laborde, Cabri and University of Grenoble, France
Technology Enhanced Teaching/Learning at a New Level with Dynamic Mathematics as Implemented in the New Cabri

Hee-chan Lew, Korean National University of Education
Developing and Applying "Smart" Mathematics Textbooks: Issues and Challenges

3:45 PM **Refreshments** (3rd floor Theatre)

4:00 – 5:00 PM **PARALLEL PARTICIPANT INTERACTION SESSIONS WITH SPEAKERS**

Session 1 (Palevsky Cinema)
Presider: Barbara Reys, University of Missouri
Discussion with:
Jeffrey Choppin, University of Rochester
Janine Remillard, University of Pennsylvania

Session 2 (2nd floor East Lounge)
Presider: Jon Davis, Western Michigan University
Discussion with:
A.J. Edson, Michigan State University
Nathalie Sinclair, Simon Fraser University, Canada

Session 3 (2nd floor West Lounge)
Presider: Jack Smith, Michigan State University
Discussion with:
Jean-Marie Laborde, Cabri and University of Grenoble, France
Hee-chan Lew, Korean National University of Education

Sunday, November 9, 2014

8:00 AM – 12:15 PM **Registration** (Lobby)

8:00 AM **Continental Breakfast** (Cloister Club)

8:45 AM **PANEL: DIGITAL CURRICULA IN PRACTICE** (Palevsky Cinema)

Valerie Mills, Oakland Schools, Michigan (Moderator)
Connections and Distinctions among Today's Digital Innovations and Yesterday's Innovative Curricula

Loretta Asay, Clarke County Schools, Nevada
Technology to Support Mathematics Instruction: Examples from the Real World

Josephus (John) Johnson, Battle High School, Columbia, Missouri
We Opened a New School and Gave Everyone iPads...We Are so Much Smarter Now

Brian Lemmen, Holland Christian High School, Michigan
Deeply Digital Curriculum for Deeply Digital Students

10:15 AM **Break with Refreshments** (Cloister Club)

10:30 AM **PLENARY SESSION V** (Palevsky Cinema)
Presider: Jeffrey Shih, University of Nevada – Las Vegas
Speakers:
Chad Dorsey, Concord Consortium, Massachusetts
Deeply Digital STEM Learning

David Moursund, University of Oregon
Mathematics Education Is at a Major Turning Point

12:00 – 12:15 PM **Closing Remarks** (Palevsky Cinema)
Zalman Usiskin, University of Chicago

12:15 PM **Lunch (eat in or to go)** (Cloister Club)

Speaker Biographies

Loretto Asay

Dr. Asay serves as the Instructional Technology and Innovative Projects Coordinator, in the K-12 Mathematics and Instructional Technology Department of Clark County School District, Las Vegas, Nevada. Her responsibility is to increase the appropriate use of technology in classrooms to support student learning. This involves managing several projects, such as the "e3 1:1 Project" which provides devices for over 15,000 students, 24X7, and including a robust professional development program. Her staff works closely with all departments providing professional development and grants for schools, helping them model appropriate technology use in all content areas. Dr. Asay earned a PhD from University of Nevada, Las Vegas, in Educational Psychology. Research interests include learning theory and the importance of background knowledge, especially looking at how technological tools can support that.

Jeffrey Choppin

Jeffrey Choppin directs the mathematics education program at the Warner Graduate School of Education at the University of Rochester. His methods courses challenge students' conceptions of mathematics and the teaching of mathematics while exploring the influence of societal and systemic factors on students' opportunities to learn mathematics. Choppin's research focuses on what teachers learn from using innovative curriculum materials, particularly knowledge of how instructional sequences can be used to elicit and refine student reasoning. His current project, the NSF-funded DRK-12 grant Developing Principles for Mathematics Curriculum Design and Use in the Common Core Era (ERGO), focuses on teachers' perceptions and uses of curriculum materials in the context of enacting the Common Core State Standards for Mathematics. He is interested in how digital aspects of curriculum materials transform or reify existing conceptions of curriculum, and how they can be leveraged to increase the emergent and collective development of knowledge in classrooms.

Jere Confrey

Jere Confrey is the Joseph D. Moore Distinguished Professor of Mathematics Education at North Carolina State University. She served on the National Validation Committee on the Common Core Standards. She was Vice Chairman of the Mathematics Sciences Education Board, National Academy of Sciences (1998-2004). She chaired the NRC Committee, which produced On *Evaluating Curricular Effectiveness*, and was a coauthor of NRC's *Scientific Research in Education*. She was a co-founder of the UTEACH program for Secondary Math and Science teacher preparation program at the University of Texas in Austin, and was the founder of SummerMath and co-founder of SummerMath for Teachers. She is the author of numerous pieces of software, led the development of www.turnonccmath.com, a website on the Common Core. Dr. Confrey received a Ph.D. in mathematics education from Cornell University.

Phil Daro

Phil Daro served on the writing team of the mathematics Common Core State Standards. He continues to work on implementation and policy issues related to the Common Core. He is the lead designer, mathematics, for the pad based Common Core System of Courses developed by Pearson Education. He also works in a partnership of the University of California, Stanford and others with the Oakland and San Francisco Unified School Districts for the Strategic Education Research Partnership (SERP), with a focus on mathematics and science learning. Previously, Daro was a Senior Fellow for Mathematics for America's Choice, the executive director of the Public Forum on School Accountability, directed the New Standards Project, and managed research and development for the National Center on Education and the Economy. Daro has directed large-scale teacher professional development programs for the University of California, including the California Mathematics Project and the American Mathematics Project.

Chad Dorsey

Chad Dorsey is President and CEO of the Concord Consortium, which has been an innovation leader in researching and developing STEM educational technology for the past twenty years. Chad's experience ranges across the fields of science, education, and technology. In addition to overseeing a wide variety of STEM projects at the Concord Consortium, he serves as a leader in educational technology across the field on numerous advisory groups and professional workshops. Prior to joining the Concord Consortium in 2008, Chad led teacher professional development workshops as a member of the Maine Mathematics and Science Alliance. Chad has also taught science in classrooms from middle schools through college and has guided educational reform efforts at the district-wide and whole-school levels. While earning his B.A. in physics at St. Olaf College and his M.A. in physics at the University of Oregon, Chad conducted experimental fluid mechanics research, built software models of Antarctic ice streams, and dragged a radar sled by hand across South Cascade Glacier. He first met computers when his family hooked an Apple II to their fancy new color TV set, and he's been a shameless geek ever since.

A.J. Edson

Alden J. Edson is presently a postdoctoral research associate with the Connected Mathematics Project at Michigan State University. He has been a doctoral fellow in the Center for the Study of Mathematics Curriculum and a research assistant in the Core-Plus Mathematics Project and in the Transition to College Mathematics and Statistics Project. He recently received his Ph.D. in mathematics education in 2014 from Western Michigan University. His dissertation was titled, *A Deeply Digital Instructional Unit on Binomial Distributions and Statistical Inference: A Design Experiment*. His research interests are in secondary school mathematics curriculum design and development, and in efficacy studies focusing on innovative digital instructional materials, with special attention to probability and statistics.

Josephus Johnson

John Josephus Johnson is the Mathematics Department Chair at Battle High School in Columbia, Mo. He has been a classroom teacher for 11 years serving students ranging from At Risk programs to Honors level while teaching courses from 8th grade through AP Calculus.

Jean-Marie Laborde

Jean-Marie Laborde invented the concept of dynamic geometry in 1985. He studied at the Ecole Normale Supérieure in Mathematics. In 1970, he joined the Centre National de la Recherche Scientifique (CNRS). His doctoral thesis (1977) was devoted to geometric methods for the study of certain classes of graphs, specifically hypercubes, with connection to Automatic Theorem Proving. In 1981 he founded a group of researchers to start the project Cabri (computerized sketchpad), originally devoted to graph theory. He was appointed in 1994 Director of Research at CNRS leading the EIAH team (Computer Environments for Human Learning). At that time, he developed significant cooperation with Texas Instruments (Dallas) to adapt *Cabri-Geometry SW* on their graphing calculators. He has been a professor and lecturer at various universities in many countries and has supervised more than 15 Ph.D. dissertations. Since 2008 Jean-Marie has led the development of Cabri technology at a new level, offering 2D and 3D direct manipulation in mathematics. He has received various honors including a Doctor Honoris Causa from St Olaf College (MN) in 2007, and he was Named Knight of the Legion of Honor on Bastille Day, July 14, 2012.

Brian Lemmen

Brian Lemmen has been teaching high school mathematics for 31 years. He currently is teaching at Holland (MI) Christian High School, a six-year recipient of the Apple Distinguished Program Award. Brian received his BA degree in mathematics in 1983 from Calvin College and his MA from California State University at Fullerton in 1991. He has been involved with the Core-Plus Mathematics Project (CPMP) since 1996 when Holland Christian High School first adopted CPMP. This involvement included being a field-test teacher for the 2nd edition of Core-Plus Mathematics and a professional development facilitator for multi-day workshops for new adopters across the country. More recently, Brian was a field-test teacher for the NSF-funded Transition to College Mathematics and Statistics (TCMS) course. As a field-test teacher he has provided extensive input and feedback to the development of the CPMP-Tools and TCMS-Tools software. Most recently, Brian partnered with AJ Edson, a Ph.D. candidate at Western Michigan University, in testing a prototype deeply digital unit on Binomial Distributions and Statistical Inference.

Hee-Chan Lew

Hee-chan Lew has been a professor of Department of Mathematics Education of Korea National University of Education since 1991. He has been a researcher and a research fellow of the Korea Educational Development Institute, the President for the Korea Society of Educational Studies in Mathematics, a member of International Committee of the IGPME Education, a member of the International Program Committee and a co-chair of the Local Organizing Committee for ICME-12 and now he is a member of International Program Committee for ICME-13 to be held in 2016 in Hamburg, Germany. He has directed projects in mathematics education on computer technology, teaching methods, evaluation, and textbook development funded by the Korea Research Foundation and Ministry of Education. He is the author or co-author of Korean elementary and high school mathematics textbooks, 20 research reports and more than 100 articles.

Valerie Mills

Valerie L. Mills is the Supervisor and Mathematics Education Consultant for Oakland Schools and current President of the National Council of Supervisors of Mathematics. Oakland Schools is an educational resource center serving 28 school districts and approximately 230,000 students. During her 35+ years in education she has taught high school mathematics, served as Mathematics Department Chair, K-12 Mathematics Coordinator, and Director of Curriculum for the Ypsilanti and Ann Arbor school districts in Michigan. In addition she was the Principal Investigator on five Mathematics and Science Partnership projects working with high needs districts, was a Teacher Author on the Core Plus Mathematics Project, President of the Michigan Council of Teachers of Mathematics, past chair of NCTM's Academy Services Committee, and has written numerous professional articles and professional development resources. Mills was awarded the Michigan Mathematics Education Service Award, the Presidential Award for Excellence in Mathematics and Science Teaching, and the Milken National Educator Award.

David Moursund

David Moursund has a doctorate in mathematics from the University of Wisconsin, Madison. He taught mathematics at Michigan State University and University of Oregon. He served six years as the first Head of the Computer Science Department at the University of Oregon and was a professor in the UO's College of Education for more than 20 years.
His professional career includes founding the International Society for Technology in Education (ISTE) in 1979, serving as ISTE's executive officer for 19 years, and establishing ISTE's flagship publication, *Learning and Leading with Technology*. He was the major professor or co-major professor for 82 doctoral students - six in Mathematics and 76 in Computers in Education. He has authored or coauthored more than 60 academic books and hundreds of articles. In 2007, Moursund founded the non-profit Information Age Education (IAE). IAE provides free online educational materials via its IAE-pedia, IAE Newsletter, IAE Blog, and books.

Mogens Niss

Mogens Niss was trained as a pure mathematician at the University of Copenhagen, where he stayed during the first years of his academic career. In 1972 he joined the founding staff of Röskilde University, where he still works. His research interests gradually turned towards mathematics education, especially concerning the justification problem in mathematics education, mathematical applications and modeling, mathematical competencies, assessment, and the nature and development of mathematics education as a research domain. Recently he has become preoccupied with mathematical learning difficulties with high school students. He has been deeply involved in international collaboration in mathematics education, especially as the Secretary General of ICMI (1991-1998), and as a member of the OECD-PISA mathematics expert group (1998-2012). He is currently a member of the Education Committee of the European Mathematical Society. In 2013 he was elected Inaugural Fellow of the American Mathematical Society. He holds an honorary doctorate from the University of Umeå (Sweden).

Janine Remillard

Dr. Janine Remillard is an associate professor of mathematics education at the University of Pennsylvania's Graduate School of Education. Her research interests include teachers' interactions with mathematics curriculum materials, mathematics teacher learning in urban classrooms, and locally relevant mathematics instruction. She is one of the primary faculty in Penn-GSE's urban teacher education program and is co-editor of the volume, *Mathematics Teachers at Work: Connecting Curriculum Materials and Classroom Instruction*. She is P.I. of two NSF-funded studies: Improving Curriculum Use for Better Teaching and Learning About New Demands in Schools: Considering Algebra Policy Environments. Remillard is active in the mathematics education community. She is a research associate of CSMC, chairs the U.S. National Commission on Mathematics Instruction, a commission of the National Academy of Science, and is currently co-chair of SIG-RME.

Kenneth Ruthven

After teaching in schools in Scotland and England, Kenneth Ruthven joined the Faculty of Education at the University of Cambridge where he is now Professor of Education and has served as Chair of the Science, Technology and Mathematics Education group and as Director of Research for the Faculty. His research focuses on curriculum, pedagogy and assessment, especially in school mathematics, and particularly in respect of the complex and contested process of adaptation to technological innovation. Ken(neth) is former Editor-in-Chief of *Educational Studies in Mathematics*, recent Chair of the British Society for Research into Learning Mathematics, current Chair of Trustees of the School Mathematics Project (SMP), and a Fellow of the Academy of Social Sciences (AcSS). Further information, recent projects and selected publications can be accessed at http://www.educ.cam.ac.uk/people/staff/ruthven/.

Nathalie Sinclair

Nathalie Sinclair is a full professor in the Faculty of Education, an associate member in the Department of Mathematics and a Canada Research Chair in Tangible Mathematics Learning at Simon Fraser University. She is also an associate editor of *For the Learning of Mathematics* and is founding editors for a new journal entitled *Digital Experiences in Mathematics Education*. She is the author of *Mathematics and Beauty: Aesthetic Approaches to Teaching Children* (2006) and *Developing Essential Understanding of Geometry for Teaching Mathematics* (2012), among other books. Her primary research concerns the role of digital technologies in the teaching and learning of mathematics, most recently focusing on multi-touch devices and early number sense.

Kaye Stacey

Kaye Stacey is Emeritus Professor of Mathematics Education at the University of Melbourne, having held the foundation chair there for 20 years. She has worked as a researcher, primary and secondary teacher educator, supervisor of graduate research and as an adviser to governments. She has written many practically-oriented books and articles for mathematics teachers as well as producing a large set of research articles. Professor Stacey's research interests center on mathematical thinking and problem solving and the mathematics curriculum, particularly the challenges that are faced in adapting to the new technological environment. Her research work is renowned for its high engagement with schools. Her doctoral thesis from the University of Oxford, UK, is in number theory. She was the Chair of the Mathematics Expert Group for the OECD's 2012 PISA survey. Kaye Stacey was awarded a Centenary Medal from the Australian government for outstanding services to mathematical education.

Michal Yerushalmy

Michal Yerushalmy is a professor in the department of Mathematics Education at the University of Haifa, Israel. Yerushalmy is the director of the Institute of Research and Development of Alternatives in Education, a member of the Learning in Networked Society (LINKS) National Research Center and Vice President for Research of the University of Haifa. Yerushalmy studies mathematical learning and teaching, focusing on design and implementation of reformed curricula and on cognitive processes involved in learning with multiple external representations, bodily interactions and modeling. Yerushalmy co-authored and designed numerous software packages in geometry (*The Geometric Supposer*), algebra curriculum (the interactive *VisualMath* secondary school mathematics web curriculum) and studies learning of calculus in dynamic and multi-representation environments. Current projects focus on learning with interactive diagrams in interactive electronic books and on mLearning. In the Math4Mobile project Yerushalmy offers ways to make technology available for mathematical inquiry learning everywhere. Over the past 25 years she has taught courses of didactic methods of mathematics and on cognitive and curricular implications of technology for education. Michal Yerushalmy received the 2010 ISDDE Prize for Excellence in Educational Design.