Innovation in Education
Connecting How we Learn to Educational Practice and Policy: Research Evidence and Implications

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Presenter's Bios - The Science of Learning Centers

Nora S. Newcombe
Spatial Intelligence and Learning Center

Dr. Nora S. Newcombe is Professor of Psychology and James H. Glackin Distinguished Faculty Fellow at Temple University. Her Ph.D. is from Harvard University. Her research focuses on spatial cognition and development, including the nature of gender differences in spatial ability. She is also interested in the development of autobiographical and episodic memory. Dr. Newcombe is the author of numerous chapters, articles, and books, including Making Space with Janellen Huttenlocher (published by the MIT Press, 2000). Her work has been recognized by several awards, including the George A. Miller Award and the G. Stanley Hall Award. She is a member of the American Academy of Arts and Sciences and of the Society of Experimental Psychologists. She has served as Editor of the Journal of Experimental Psychology: General and Associate Editor of Psychological Bulletin, as well as on many grant panels and advisory boards. She is currently Principal Investigator of the NSF-funded Spatial Intelligence and Learning Center, whose mission is to understand human spatial cognition, with an emphasis on the idea that spatial knowledge and skills can be improved, and to apply the resulting knowledge to foster spatial learning, especially in STEM disciplines.

Andrew N. Meltzoff
Learning in Informal and Formal Environments Center

Dr. Andrew N. Meltzoff holds the Job and Gertrud Tamaki Endowed Chair and is the Co-Director of the University of Washington Institute for Learning & Brain Sciences. A graduate of Harvard University, with a PhD from Oxford University, he is an internationally renowned expert on infant and child development. His discoveries about infant imitation have revolutionized our understanding of early cognition, personality, and brain development. His research on social-emotional development and children's understanding of other people has helped shape policy and practice. Dr. Meltzoff's 20 years of research on young children has had far-reaching implications for cognitive science, especially for ideas about memory and its development; for brain science, especially for ideas about common coding and shared neural circuits for perception and action; and for early education and parenting, particularly for ideas about the importance of role models, both adults and peers, in child development.

He is the co-author of two books about early learning and the brain: *The Scientist in the Crib: What Early Learning Tells Us about the Mind* (Morrow Press, 2000) and *Words, Thoughts and*

Theories (MIT Press, 1997). He is also co-editor of *The Imitative Mind: Development, Evolution and Brain Bases* (Cambridge University Press, 2002), a unique, multidisciplinary volume combining brain science, evolutionary theory, and developmental psychology.

Dr. Meltzoff is the recipient of a MERIT Award from the National Institutes of Health. In 2005, he was the recipient of an award for outstanding research from the Society for Developmental and Behavioral Pediatrics and the Kenneth Craik Award in Psychology, Cambridge University, England. Dr. Meltzoff is a Fellow of the American Academy of Arts & Sciences, the American Association for the Advancement of Science, the American Psychological Association, and the American Psychological Society. He has been inducted into the Norwegian Academy of Science and Letters and is the recipient of the James McKeen Cattell Sabbatical Award.

Patricia K. Kuhl
Learning in Informal and Formal Environments Center

Dr. Patricia K. Kuhl holds the Bezos Family Foundation Endowed Chair in Early Childhood Learning and is Co-Director of the UW Institute for Learning and Brain Sciences, Director of the University of Washington's NSF Science of Learning Center, and Professor of Speech and Hearing Sciences at the University of Washington in Seattle. She is internationally recognized for her research on early language and bilingual brain development, and studies that show how young children learn. Dr. Kuhl's work has played a major role in demonstrating how early exposure to language alters the brain, and how early measures of the brain's response to language predict the course of language development. These data have implications for bilingual education and reading readiness, for early diagnosis of developmental disabilities such as autism, and for research on 'critical periods' in human development.

Dr. Kuhl is a member of the American Academy of Arts and Sciences, the Rodin Academy, and the Norwegian Academy of Science and Letters, and is a Fellow of the American Association for the Advancement of Science, the Acoustical Society of America, and the American Psychological Society. Dr. Kuhl was awarded the Silver Medal of the Acoustical Society of America in 1997. In 2005, she was awarded the Kenneth Craik Research Award from Cambridge University. She received the University of Washington's Faculty Lectureship Award in 1998. In 2007, Dr. Kuhl was awarded the University of Minnesota's Outstanding Achievement Award. In 2008, Dr. Kuhl was one of 30 scientists worldwide invited to present their work at a Nobel Symposium entitled, 'Brain, Genes, and Behavior'—she was the only scientist representing human development. In Paris in 2008, Dr. Kuhl was awarded the Gold Medal of the American Institute of Physics for her work on early learning and brain development. In 2010, Dr. Kuhl was elected to the National Academy of Sciences. In November 2011 in Paris, Dr. Kuhl was awarded the IPSEN Fondation's Jean-Louis Signoret Neuropsychology Prize.

Dr. Kuhl has participated in policy discussions related to early learning with two White House administrations. She was one of six scientists invited to the White House in 1997 to make a presentation at President and Mrs. Clinton's Conference on "Early Learning and the Brain." In 2001, Dr. Kuhl was invited to make a presentation at President and Mrs. Bush's White House Summit on "Early Cognitive Development: Ready to Read, Ready to Learn." In 2001, she co-authored *The Scientist in the Crib: Minds, Brains, and How Children Learn* (Harper Collins).

Roy Pea
Learning in Informal and Formal Environments Center

Dr. Roy Pea is David Jacks Professor of Education and the Learning Sciences at Stanford University, Director of Stanford's H-STAR Institute (Human Sciences and Technologies Advanced Research), and founder and Director of Stanford's PhD program in Learning Sciences and Technology Design. Dr. Pea has published widely on K-12 learning and education, especially in science, math and technology, fostered by advanced technologies including scientific visualization, on-line communities, digital video collaboratories and mobile computers. He is co-author of the 2010 National Education Technology Plan for the US Department of Education, co-editor of Video Research in the Learning Sciences (2007), and co-author of the National Academy of Sciences book: How People Learn (2000). He is a Fellow of the National Academy of Education, Association for Psychological Science, the American Educational Research Association, and was an IBM Faculty Fellow (2006). In 2004-2005, Dr. Pea was President of the International Society for the Learning Sciences. Dr. Pea also served from 1999-2009 as a Director for Teachscape, a teacher professional development services company he co-founded with CEO Mark Atkinson. Dr. Pea holds three patents creating innovations in interactive video, with several other patents pending. He is a Director of Kogeto.com and serves as an advisor to several other companies.

Laura-Ann Petitto
Visual Language and Visual Learning Center

Dr. Laura Ann Petitto is a Cognitive Neuroscientist and a Developmental Cognitive Neuroscientist widely known for her discoveries about the biological foundations of language. She has uncovered key brain structures underlying early human language processing and, with brain imaging technology called functional Near-infrared Spectroscopy (fNIRS), she has tracked the typical and atypical development of these brain structures across the human lifespan (infants through adults). Dr. Petitto is also known for her discoveries involving animal language and animal communication in chimpanzees, following from her groundbreaking roles as Primary/Head Teacher and Project Coordinator of "Project Nim Chimpsky", at Columbia University. She lived with the chimp and attempted to teach it sign language as his primary surrogate mother. As a result, Dr. Petitto and her colleagues have authored several of the world's influential scholarly articles on the ape and human minds.

Dr. Petitto is further known for her discoveries about Bilingualism and the Bilingual Brain. She has identified the neural tissue and systems in the human baby's brain when it is acquiring one language versus two languages. Dr. Petitto is also known for her discoveries about Reading and the Reading Brain. She has studied monolingual and bilingual children when they first begin to Read, achieve skilled Reading, and when monolingual and bilingual adults Read and process language. Her body of work includes the discovery of babbling on the hands in Deaf children exposed to signed languages (Manual Babbling), studies of the brain-based systems that govern mouth asymmetries in hearing children's vocal babbling, the maturational timing of bilingual children's achievement of the classic language milestones, and the similarities and differences between all children's early gestures and early language (first words, pronouns). Dr. Petitto has further made fundamental discoveries involving the acquisition, grammar, and brain organization of the signed languages of Deaf people, in particular, American Sign Language. Dr. Petitto is widely known for advancing a testable theory about the biological and environmental factors that, together, make possible human language acquisition.

Dr. Petitto has also played a pivotal role in the creation of a new scientific discipline, called Educational Neuroscience, otherwise known as Mind, Brain, and Education, which applies core discoveries in the developmental brain sciences to prevailing problems in education. Dr. Petitto is the author of over 100 scholarly articles, the winner of 3 major awards for her outstanding teaching, and the recipient of over 25 international prizes and awards for her scientific discoveries, including the 1998 Guggenheim Award for her "unusually distinguished achievements in the past and exceptional promise for future accomplishment in the discipline of Neuroscience." In February 2009, she was appointed Fellow of the American Association for the Advancement of Science (AAAS), as well as Fellow of the Association for Psychological Science (APS).

John Stamper
LearnLab-Pittsburgh Science of Learning Center

Dr. John Stamper is the Technical Director of the Pittsburgh Science of Learning Center DataShop. He is also a member of the research faculty at the Human-Computer Interaction Institute at Carnegie Mellon University. His primary areas of research include Educational Data Mining and Intelligent Tutoring Systems. As Technical Director, Dr. Stamper oversees the DataShop, which is an open data repository and set of associated visualization and analysis tools for researchers in the learning sciences. DataShop has data from thousands of students deriving from interactions with on-line course materials and intelligent tutoring systems. The data is fine-grained, with student actions recorded roughly every 20 seconds, and it is longitudinal, spanning semester or yearlong courses. As of December 2011, over 300 datasets are stored including over 70 million student actions which equates to almost 200,000 student hours of data. Dr. Stamper received his Ph.D. in Information Technology from the University of North Carolina at Charlotte, holds an MBA from the University of Cincinnati, and a BS in Systems Analysis from Miami University. Prior to returning to academia, Dr. Stamper spent over ten years in the software industry. He is a Microsoft Certified Systems Engineer (MCSE) and a Microsoft Certified Database Administrator (MCDBA). Dr. Stamper was the co-chair of the 2010 KDD Cup Competition, titled "Educational Data Mining Challenge," which centered on improving assessment of student learning via data mining.

David Uttal
Spatial Intelligence and Learning Center

Dr. David Uttal is Professor of Psychology and Education at Northwestern University. He serves as Director of the Multidisciplinary Program in Education Sciences, and IES-funded pre-doctoral training program that focuses on interdisciplinary and mixed methods approaches to education research. He also serves as Director of the Cognitive Division in the Psychology Department. He is a Fellow of the American Psychological Association and the American Psychological Society. Dr. Uttal's work has been funded by the National Institutes of Health, the National Science Foundation, and the Institute for Education Sciences.

His research interests are in spatial and mathematical thinking and their development. He has studied the development of children's understanding of spatial and mathematical symbols, and the influence of acquiring this knowledge on development. For example, he studies the early development of map-reading skills and the cognitive consequences of using maps on spatial thinking. He is also interested in the role of spatial thinking in STEM education and recently completed a meta-analysis on the malleability of spatial thinking, which demonstrated that even

small amounts of training and experience can lead to substantial gains in spatial thinking. He works in a variety of contexts, including museums, homes, schools, and the laboratory. For example, with Catherine Haden he is studying how children's early experiences with simple engineering problems in the Chicago Children's Museum affects children's ability to solve similar spatial problems and whether what is learned in the museum transfers to other contexts, such as the home.

Susan C. Levine
Spatial Intelligence and Learning Center

Dr. Susan Levine is the Stella M. Rowley Professor in the Departments of Psychology, Comparative Human Development, and the Committee on Education at the University of Chicago, where she serves as the chair of the Department of Psychology. She is a co-PI of the Spatial Intelligence and Learning Center (SILC). Her research focuses on the development of language, mathematical and spatial skills in typically developing children and children with focal perinatal brain injury. Ongoing projects examine the relation of children's spatial and numerical skills and the role of various kinds of learning experiences on children's early mathematics learning trajectories. Her work also examines socio-emotional factors that may impact children's learning, including elementary school teachers' math and spatial anxieties, students' own anxieties about these domains, and their stereotypes about achievement in these domains. A major new translational project involves a partnership with researchers working on a revision of a widely used mathematics curriculum. This effort involves incorporating findings from developmental science into the curriculum with the goal of enhancing young children's learning. In addition to journal articles, Dr. Levine has co-authored two books, *Quantitiative Development in Early Childhood (2002)* and *Neural Plasticity and Cognitive Development: Insights from Children with Perinatal Brain Injury (in press)*. Dr. Levine is a fellow of the Association for Psychological Science and the American Association for the Advancement of Science.

Andrea Chiba
Temporal Dynamics of Learning Center

Dr. Andrea Chiba is an Associate Professor in the Department of Cognitive Science and in the Program for Neuroscience and Computational Neuroscience at the University of California, San Diego. She is Science Director for the Temporal Dynamics of Learning Center, an NSF Science of Learning Center. The Center research is focused on the importance of time and timing in various aspects of learning, from the level of the synapse to social interactions. The goal of the Center is not only to understand learning, but to translate this understanding to the practice of educating. Dr. Chiba's own laboratory is focused on gaining an understanding of the neural systems and principles underlying aspects of learning and memory, affect, and attention, with an emphasis on neural plasticity. Her work is highly interdisciplinary, using a variety of neurobiological, computational, and behavioral techniques.