Building bridges between basic science and education practice defines Liz’s expertise. Trained in the behavioral and social sciences, with an emphasis on psychology, cognition, and communication, Liz brings expertise in the basic sciences of learning to education practice. Since 2002, Liz has been part of the Institute of Education Sciences, the independent research arm of the U.S. Department of Education.

Our mission is to provide rigorous and relevant evidence on which to ground education practice and policy and share this information broadly. By identifying what works, what doesn’t, and why, we aim to improve educational outcomes for all students, particularly those at risk of failure. We are the research arm of the U.S. Department of Education, and by law our activities must be free of partisan political influence.

A large-scale assessment system that supports formative, interim and summative assessments requires a complex set of technology to support assessment design, administration and reporting. Smarter Balanced has created a complex technology eco-system based on the successful designs of states and service providers. The Smarter Balanced system is unique in that it is founded on the principles of open-source technology and also based on a complex set of interoperability specifications to allow its members to choose to use a combination of open source and proprietary components. This presentation will provide an overview of the components and how they support the operations of the assessment system.

For almost 150 years, UC has expanded the horizons of what we know about ourselves and our world. Our campuses are routinely ranked among the best in the world, but our reach extends beyond campus borders.
Our students, faculty, staff and alumni exchange ideas, make advancements and unlock the secrets and mysteries of the universe every day. They engage with their local governments, serve California schools, protect the environment and push the boundaries of space.

EVA BAKER
CRESST/UCLA

Distinguished Professor in the divisions of Psychological Studies in Education and Social Research Methodology at the UCLA Graduate School of Education and Information Studies, Eva L. Baker has directed the UCLA Center for the Study of Evaluation (CSE) since 1975. She is also Director of the National Center for Research on Evaluation, Standards, and Student Testing (CRESST), a competitively awarded national institution funded by the U.S. Department of Education.

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Lessons from Yoda on Dealing with Change

This discussion proposes the elements of the educational ecosystem and their contributions and inhibitions to learners’ growth and development. All of its facets are undergoing rapid change, the ecosystem is complex, and the few elements considered include the roles of the home and of parents, of educational institutions and the teachers and educators within them. The political landscape, perhaps due for dramatic change exerts enormous effects of the context of learning, through explicated policy, through amplifying the elements of society. It acts through rarely well-planned and often disastrous manipulation of public and private finances. Growth in specific technologies and platforms continue apace as an exponential cliché. The depth and specialty of data to improve learning will continue to confront personal ownership and privacy issues. Commercial behemoths, on the path to greater size and reach will soon affect student learning more directly in institutional as well as the current extra curricular activities. Continuing along, with flashes of major effects, are the small scales but ever-hopeful innovators, seeking to become tigers of industry. The presentation concludes with coping and triumphant advice for the R&D community.

RYAN BAKER
Teachers College, Columbia University

Ryan Baker is Associate Professor at Teachers College, Columbia University. He earned his Ph.D. in Human-Computer Interaction from Carnegie Mellon University’s School of Computer Science, and was a post-doctoral fellow in the Learning Sciences at the University of Nottingham. He earned his Bachelor's Degree (Sc.B.) in Computer Science from Brown University.

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Teachers College, Columbia University is the oldest and largest graduate school of education in the United States and is also perennially ranked among the nation’s best. Its name notwithstanding, the College is committed to a vision of education writ large, encompassing our four core areas of expertise: health, education, leadership, and psychology.

Teachers College sees its leadership role in two complementary arenas. One is as a major player in policy-making to ensure that schools are reformed and restructured to welcome all students regardless of their socio-economic circumstances. The other is in preparing educators who not only serve students directly but also coordinate the educational, psychological, behavioral, technological, and health initiatives to remove barriers to learning at all ages.

SASHA BARAB
Arizona State University

Professor Sasha Barab is an internationally recognized Learning Scientist who has researched, designed, and published extensively on the challenges and opportunities of using games for impact. More recently, his work has focused on designing, scaling, and optimizing innovations for impact. He is a professor in the Mary Lou Fulton Teachers College at Arizona State University, where he holds the Pinnacle West Presidential Chair. He is also a founding member and
Director of the Center for Games and Impact. His research has resulted in numerous grants, dozens of articles and multiple chapters in published books, which investigate knowing and learning in its material, social and cultural context, and multiple innovations that have impacted tens of thousands of users.

His design work includes everything from bounded games used in K-12 classrooms to multiuser virtual worlds with thousands of connected participants to game-enabled services designed to support users in achieving real-world goals. His current work extends the design boundaries from ‘magic circle’ surrounding game worlds to complex real-world ecosystems with the goal of helping all learners thrive in a complex, rapidly changing, digitally connected world. Across these innovations is a sensitivity to factors such as ecosystem integration, stakeholder alignment, storied truths, enacted agency, ongoing optimization, and sustainable and scalable outcomes. All with the goal of helping individuals to THRIVE in a complex, rapidly changing, digitally connected world.

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Pinnacle West Chair in Teacher Education, Professor and Director, Center for Games and Impact

From Bounded Worlds to Game-Enabled Ecosystems & Empowered Individuals

In this talk, I will share experiences moving from bounded worlds to game-enabled ecosystems. Rather than a focus on games as products, and impact as something one does to another, the work positions impact as a shared accomplishment that is distributed among the designers, the service providers, and those being impacted … all in relation to local ecosystem needs. When one adopts an ecosystem perspective, there is a shift from treating impact as bound up in the product or in the learning theory that motivated its design, to an impact sciences perspective that positions the “innovation” within the enactment. In this ecological model, issues like fidelity are no longer about how well the implementation matches the designer’s intent, and more how the innovation enables the impacting agent to realize goals that are meaningful to him or her. The real challenge in achieving sustainable and scalable impact is not about making the killer app and what it does, but more in those realizing the innovation and what it allows them to become.

ISAAC BEJAR
ETS - Educational Testing Service
Dr. Bejar is a Principal Research Scientist at Educational Testing Service. He conducts research on automated scoring and item generation.
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Computer-supported approaches for assessment design, psychometrics, and analytics

At nonprofit ETS, we are passionate about our mission to advance quality and equity in education for all people worldwide because we believe in the power of learning. We strive to provide innovative and meaningful measurement solutions that improve teaching and learning, expand educational opportunities, and inform policy.

LI CAI
CRESST/UCLA

Li Cai is an associate professor in the Advanced Quantitative Methodology program in the UCLA Graduate School of Education and Information Studies, where he also serves as Co-Director of the National Center for Research on Evaluation, Standards, and Student Testing (CRESST). Additionally, he is affiliated with the UCLA Department of Psychology in the quantitative area, where Cai also teaches and trains students.
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Professor

Background and Current Status of National Assessment of Education Quality: Setting Standards toward the Quality of Public Education in China

Xin Tao, NAEQ/ Presentated by Li Cai

This presentation covers the policy background context, conceptual framework, key methodology issues, and current status of NAEQ (National Assessment of Education Quality), the first NAEP-like nationally
representative large-scale education survey. Also discussed is the status of efforts for improvement of the quality of public education in China, with a particular emphasis on assessment and outcomes.

**BRITTE CHENG**
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RI International is a nonprofit, independent research center serving government and industry. We work on some of the world’s most important problems, collaborating across technical disciplines to spark new ideas and solutions. Our research and innovations have led to new industries and products that impact people’s lives every day—from the computer mouse and interactive computing to medical ultrasound, cancer drugs, and much more.

SRI moves R&D from the laboratory to the marketplace to create high value and real innovation. And the platforms we build today are designed to meet tomorrow’s needs. For example, an artificial intelligence project for DARPA led to the development of Siri for Apple’s iPhone.

**DAVE CHO**
Classting  
Dave Cho, a co-founder and CEO at Classting, felt regretful about the fact that the educational services provided by school could not keep up with the rapid trend of the students. To encourage active participation of the students, Dave decided to make a new service, Classting. Classting pursues an educational service that reflects the trend of the students, leads active participation of the students, and is easy for the teachers to use.

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Co-founder&CEO

When the presenter taught at an elementary school, he felt regretful that the educational services provided by school could not keep up with the rapid change of the student trend. To encourage active participation of the students, he decided to make a new service, Classting. The goal of Classting is to reflect the student trend, stimulate participation of the students in learning, and to provide an easy service for the teachers to use.

This little idea of the elementary school teacher was developed from a master’s thesis to a broader use, expanding when entrepreneurial funds joined the development.

Amazing outcome has been achieved in just 3 years. Classting is voluntarily used in 12,118 schools, over 96% of the schools in Korea. Since the service opened in 2012, Classting has been building and operating a non-stop system (24hours 365 days) for three years. Each year, the flexible system supports more than three times the traffic of the previous year. It is expanding to United States, China, Japan and Taiwan. Classting is now ready to bring its values and expertise to the global education market.

**KILCHAN CHOI**
CRESST/UCLA  
Kilchan Choi is the CRESST Assistant Director/Principal Scientist for Statistical and Methodological Innovations. His expertise is in the development and application of advanced statistical methodologies and hierarchical modeling to applied problems in multi-site evaluation, growth modeling, and school effectiveness/accountability in a large-scale assessment system. He has developed a new value-added model applied to multiple-school, multiple-cohort longitudinal data in estimating different cohort effects and teacher effects. His current research focuses on integrating item response theory, latent variable regressions, longitudinal analysis, and hierarchical models into a general comprehensive statistical model.

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What do you ask your psychometricians and methodologists?

This talk aims to discuss concerns and issues related to psychometrics, research design, and impact analysis when conducting a study with learning game(s).
begins with what need to be prepared, and presents what kinds of psychometric questions need to be asked, what the key features of data are, and what the possible questions on research design are. In addition, some of recently developed psychometric models and impact analysis models are very briefly discussed and some suggestions are presented.

GREG CHUNG
CRESST/UCLA

Greg Chung is Assistant Director for Research Innovation at the National Center for Research on Evaluation, Standards, and Student Testing (CRESST). He has extensive experience in the application of technology for learning and assessment, particularly in the area of mathematics education. He currently serves as Co-PI for the Center for Advanced Technology in Schools, where he has led the design and testing of experimentally vetted computer games and assessments for math learning. He has conducted instructional game and assessment development and research for DARPA, ONR, PBS Kids, and numerous other foundations and commercial vendors. He is leading the design and testing of computer-based games and assessments for early childhood STEM learning as part of the DARPA-funded ENGAGE project. Beyond his expertise in instructional technology and STEM, Dr. Chung has successfully managed multiple large- and mid-scale efficacy studies in school, afterschool, and early childhood settings. He has experience in developing Web-based assessment tools for diagnostic and embedded assessment purposes using Bayesian networks, domain ontologies, and other advanced computational tools.

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GUIDELINES FOR THE DESIGN AND IMPLEMENTATION OF GAME TELEMETRY

The design of game telemetry requires careful attention to the chain of reasoning that connects low-level behavioral events to inferences about players’ learning and performance. Measuring performance in games is often difficult because seldom do direct measures of the desired outcome exist in the game. Game telemetry is conceived as the fundamental element from which measures of player performance are developed. General issues are raised for game-based measurement, and data issues are raised around format, context, and increasing the meaningfulness of the data itself. Practical guidelines for the design of game telemetry are presented, including targeting in-game behaviors that reflect cognitive demands, recoding data at the finest usable grain size, representing the data in a format usable by the largest number of people, and recording descriptions of behavior and not inferences with as much contextual information as practical.

KATHARINE CLEMMER
Loyola Marymount University & El Segundo Unified School District

Devoted to providing excellent mathematics instruction to all students, Kathy Clemmer has been a leader in math education for over 20 years at the secondary and graduate levels. As one of the founders and director for Loyola Marymount University’s Mathematics Leadership Corps, Kathy co-authored and teaches the Mathematics Leadership & Learning by Design instructional moves, coaches teacher leaders to be change agents within their organizations, and thrives on the edge of chaos. In addition, Kathy currently teaches at El Segundo High school near Los Angeles, California.

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ESUSD, El Segundo High School Math Teacher

El Segundo High School will provide students with the necessary skills and knowledge to become lifelong learners, effective communicators and socially productive citizens who are prepared for life choices and challenges in a global society.

SETH CORRIGAN
GlassLab

Seth Corrigan is the Research Scientist for Learning Analytics at GlassLab Games where he uses psychometrics, educational data mining and principled design to create responsive game-based assessments and simulations. He is also a member of the Embodied Design Research Laboratory at UC Berkeley, using
dynamic models to "turn touch into knowledge" about embodied cognition in mathematics. Seth has over ten years of experience contributing to and directing national, regional and local projects in measurement, assessment and evaluation.

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Research Scientist for Learning Analytics

We empower youth to claim their path to 21st century success through high-impact digital games.

ZOË CORWIN
USC Rossier School of Education

As a researcher with the Pullias Center for Higher Education, Corwin has served as co-PI on grants supported by the Spencer Foundation, the Bill & Melinda Gates Foundation and the US Department of Education (IES & First in the World) examining college preparation programs and access to financial aid for underserved students, college pathways for foster youth and the role of social media and games in postsecondary access and completion. For the past five years, Corwin has been collaborating with USC’s Game Innovation Lab to create – and conduct research on -- a series of games to engage middle and high school students in college preparation, college application and financial aid processes.

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Associate Professor of Research

For first generation students, college can seem like an amorphous concept. Oftentimes students are not aware of their postsecondary options – others have strong college aspirations but lack a clear understanding of how to apply. This session highlights an effort by USC’s Pullias Center for Higher Education and USC’s Game Innovation Lab to develop and conduct research on a suite of games designed to engage middle and high school students in the college readiness and college application processes.

GIRLIE DELACRUZ
CRESST/UCLA

Girlie Delacruz is an experienced applied research scientist with over 14 years in the areas of assessment, learning, education, cognitive and learning science, and developmental psychology. Her primary research goals lie at the intersection of theories of assessment and learning in educational, training, and military contexts, with a focus on the design and use of various forms of technology including computers, web and mobile-based applications, video games, and sensor-based networks. In the area of assessment, her research focuses on issues of validity, effective and efficient assessment design, and the use of advanced computational models to support formative assessment and adaptive learning. She is currently the co-Project Director of a DARPA-funded grant to develop and validate technology-based games and assessments of young children’s understanding of physics and social and emotional concepts through problem-solving.

Dr. Delacruz has published numerous articles in scholarly journals and has written book chapters on the topic of technology in education. Because of expertise in learning and assessment technologies, she has been invited to sit on Small Business Innovation Research review panels in the area of mobile gaming for the National Institutes of Health and the U.S. Department of Agriculture.

Dr. Delacruz is a MacArthur Foundation/ETS Edmund W. Gordon Fellow--awarded to emerging scholars concerned with the impact of new technologies, recent advances in the learning sciences, and the broader impact of assessment and learning on society in the 21st century.

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Truly wonderful, the mind of a child is: Engaging young children with educational games

CRESST developed a bundle of games that teach both physics and social and emotional concepts through problem solving. These games were designed for young children in grades K-3. In this session, we will discuss R&D about two of the games: Go Vector Go and Team Vector to the Rescue. In Go Vector Go (GVG), students are asked to help Vector the Train reach his destination,
while collecting stars and avoiding obstacles such as dynamite. To help Vector move, students manipulate various physics factors such as force magnitude and direction, mass, slope, and friction. Students must consider how far Vector is from his destination and potential obstacles to overcome, and whether Vector is moving at a fast or slow speed before deciding what actions to take. Team Vector to the Rescue (TVR) game is an extension of Go Vector Go. In addition to the same physics concepts that are covered in GVG, students also learn the concepts of perspective taking, emotion recognition, teamwork, anti-bullying, and conflict resolution. Students learn perspective taking by first identifying the ‘problem’, i.e., how their friend is feeling by choosing emoticons. They then explore different approaches to resolving the conflict and are shown the outcomes of each approach to learn the best solution. We transformed the classroom practices of argumentation and discussion among students into a game mechanic. The game characters model the concepts and options through discussion. Students are then asked to help the team decide how best to fix the problem.

SARA DEWITT

PBS KIDS

DeWitt oversees production of connected and immersive educational experiences for kids across multiple media platforms, including PBSKIDS.org, the library of PBS KIDS apps, and streaming video channels.

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PBS KIDS is committed to making a positive impact on the lives of children through curriculum-based entertainment. With a 360-degree approach towards learning and reaching children, PBS KIDS leverages the full spectrum of media and technology to build knowledge, critical thinking, imagination and curiosity. By involving parents, teachers, caregivers and communities as learning partners, PBS KIDS helps to empower children for success in school and in life.

JIM DIAMOND

EDC

Jim Diamond is a researcher at the Education Development Center’s Center for Children and Technology. As a formative researcher, he studies how digital games and other technologies can be used to enrich teaching and learning in K–12 education. He is the co-PI on an NSF-funded project to study how teachers use game play data to inform their instructional practices, and the PI on an NSF-funded planning project to create partnerships that use digital badge systems to expand learning pathways in STEM for underrepresented youth. He also plays a lot of video games.

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EDC designs, implements, and evaluates programs to improve education, health, and economic opportunity worldwide. Collaborating with both public and private partners, we strive for a world where all people are empowered to live healthy, productive lives.

EDC is committed to education that builds knowledge and skill, makes possible a deeper understanding of the world, and engages learners as active, problem-solving participants. While the issues we address are diverse, all that we do is united by our conviction that learning is the liberating force in human development.

EDC currently employs 1,350 staff in the United States and around the world, including teachers, health and social science professionals, mathematicians, professional development experts, scientists, researchers, and management and technology specialists.

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UCLA’s primary purpose as a public research university is the creation, dissemination, preservation and application of knowledge for the betterment of our global society. To fulfill this mission, UCLA is committed to
academic freedom in its fullest terms: We value open access to information, free and lively debate conducted with mutual respect for individuals, and freedom from intolerance. In all of our pursuits, we strive at once for excellence and diversity, recognizing that openness and inclusion produce true quality. These values underlie our three institutional responsibilities.

HEIDI ESTEVEZ
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Second largest in the nation, the Los Angeles Unified School District (LAUSD) enrolls more than 640,000 students in kindergarten through 12th grade, at over 900 schools, and 187 public charter schools. The boundaries spread over 720 square miles and include the mega-city of Los Angeles as well as all or parts of 31 smaller municipalities plus several unincorporated sections of Southern California.

BRIAN FOLEY
CSUN

Brian Foley, Ph.D., is a Professor of Secondary Education at California State University Northridge. His research looks at uses of technology in the classroom to promote learning particularly in science education. Recent work looks developing teaching methods for using science classrooms through the use of collaborative documents. Before coming to CSUN, Brian completed his Ph.D. at UC Berkeley and worked at the Caltech Precollege Science Initiative and at UC Irvine.

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The announcement of the LAUSD iPad program in 2013 was a bold move towards a connected education system. For the second largest school district in the country to implement one-to-one technology sent a message that the 21st century was finally taking hold in our schools. The ultimate failure of the program before it was ever implemented illustrates the challenges facing schools and large urban districts. We look at some of the problems especially the inadequate teacher preparation in the pilot schools. Teachers had no idea what to do once they their students had the devices. In contrast, the Computer Supported Collaborative Science project has been working with science (and recently math) teachers on how to utilize the technology to make their instruction more effective and engaging. Building on Computer Supported Collaborative Learning (CSCL) for science classrooms we are able to prepare teachers for the coming digital classroom. We describe on our PD methods that utilize immersion in connected classrooms and the results from the training and resulting instruction.

ED GORDON
Teachers College, Columbia University

Edmund W. Gordon is the John M. Musser Professor of Psychology, Emeritus at Yale University, Richard March Hoe Professor, Emeritus of Psychology and Education, and Director of the Institute of Urban and Minority Education (IUME) at Teachers College, Columbia University. From July 2000 until August, 2001 he was Vice President of Academic Affairs and Interim Dean at Teachers College, Columbia University.

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Professor Gordon is concerned with issues associated with increasing the number of high academic achieving students who come from African American, Latino, and Native American families. He is widely known for his research on diverse human characteristics and pedagogy, and the education of low status populations. He is interested in the career development of Black men who have overcome enormous odds against success to become high achievers. Recent research interests include the advancement of his concepts of "affirmative development of academic ability" and "supplementary education" both which focus on improving the quality of academic achievement in diverse learners. His current study group on the Correlates of High Academic Achievement is investigating, through several projects, personal, ecological, and institutional factors that are
associated high levels of academic achievement in a variety of ethnic minority students.

JOAN HERMAN
CRESST/UCLA
Joan Herman is Co-Director Emeritus of the National Center for Research on Evaluation, Standards, and Student Testing (CRESST) at UCLA. Her research has explored the effects of testing on schools and the design of assessment systems to support school planning and instructional improvement. Her recent work focuses on the validity and utility of teachers’ formative assessment practices and the assessment of deeper learning. She also has wide experience as an evaluator of school reform.

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Senior Scientist

For 40 years, the UCLA Center for the Study of Evaluation (CSE) and, more recently, the National Center for Research on Evaluation, Standards, and Student Testing (CRESST) have been at the forefront of efforts to improve the quality of education and learning in America. Located within UCLA’s Graduate School of Education & Information Studies, CSE/CRESST has long contributed to the development of scientifically based evaluation and testing techniques, vigorously encouraged the development, validation and use of sound data for improved accountability and decision making, and aggressively explored technological applications to improve assessment and evaluation practice.

In the past few years, CSE/CRESST has grown to meet expanded needs, substantially broadening our work well beyond our historical K-12 audience. Today, our research and development serves government, military, and pre-K through college-level education and training. We have successfully scaled up our models-based accountability research to create innovative assessment and accountability systems for learners of almost every age. While our audiences have expanded, we remain committed to high-quality accountability research and evaluation methods that inform teaching and increase learning.

KIMBERLY HIRABAYASHI
USC Rossier School of Education
Dr. Kim Hirabayashi has a Ph.D. in Educational Psychology and teaches a variety of courses at the master’s and doctoral levels. Her expertise is in learning, motivation, and lifespan development and is interested in the ways in which cultural affects the learning and development of learners of all ages. Dr. Hirabayashi has both academic and professional experience in K-12 and higher education. She is the current Faculty Chair of the Psychology in Education concentration and the faculty chair of the online Ed.D. Program in Organizational Change and Leadership.

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The mission of the USC Rossier School of Education (ross-EAR) is to improve learning in urban education locally, nationally and globally. Rossier leads the field in innovative, collaborative solutions to improve education outcomes. Our work is field-based, in the classroom, and online, and reflects a diversity of perspectives and experiences. We pride ourselves on innovation in all our programs, preparing teachers, administrators, and educational leaders who are change agents. We support the most forward-thinking scholars and researchers, whose work is having direct impact on student success in K-12 schools and higher education. We are leaders in using cutting-edge technology to scale up our quality programs for maximum impact.

PAUL HORWITZ
Concord Consortium
Dr. Paul Horwitz is a physicist with broad interests in the application of technology to science and math education. His research has used computer-based interactive models to create challenging learning games that pose problems and then monitor and react to students’ actions. He was the Principal Investigator on the ThinkerTools Project, which pioneered the use of such games for teaching Newtonian mechanics. RelLab, a
simulated “Relativity Laboratory” that he designed, won two EDUCOM Higher Education Software Awards. He directed the design and implementation of GenScope as well as its successor program BioLogica—multi-level models of genetic processes ranging in scale from DNA to populations. He currently serves as Principal Investigator on the Concord Consortium’s Teaching Teamwork project, funded by NSF, which is finding ways to assess students’ ability to work effectively in teams by monitoring and analyzing their actions as they work on realistic simulations of electronic circuits.

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Teamwork is an important workplace skill, but is rarely taught in the classroom, in part because it is difficult to evaluate each student’s work (Frey et al, 2006). This talk will present results from the Teaching Teamwork project, which is examining the use of collaborative online activities for evaluating the contribution of individual team members as they work together to solve simulated real-world problems from separate locations connected by the Internet. The project is supported by a grant from the Advanced Technological Education Program of the National Science Foundation.

Our concept of teamwork extends beyond merely evaluating the success or failure of a team as a whole. Instead, we focus on a more fine-grained construct that attempts to capture the complex interweaving of actions and reactions by each team member that ultimately determine how effectively the team functions. To support this assessment objective, we have designed a collaborative task that cannot be accomplished by a strategy of local optimization, but requires team members to coordinate their efforts and to postpone immediate individual gain in the pursuit of ultimate global success.

Our domain is basic electronics—specifically, Ohm’s Law. Students work in teams on separate computers, each displaying a simulated variable resistor. They are challenged to set their resistors so that the voltage across them matches a specified goal. A change made to any resistor affects the voltage across all three, so rather than concentrating on their individual goals the team members must coordinate their efforts to assure success. As they work, the software monitors their actions, including changes to resistors, measurements, chats, and uses of an online calculator. We analyze the resultant logs for patterns and benchmark these against performance on the task. We will report on some preliminary findings from this analysis.

MARKUS ISELI
CRESST/UCLA

Dr. Markus Iseli is a Senior Research Associate at CRESST/UCLA with a focus on integration of engineering and technology for educational purposes. Dr. Iseli holds a PhD and MS degrees in electrical engineering from UCLA and from ETH Zürich, Switzerland. His specialization is in digital signal processing, speech and image analysis, pattern recognition, acoustics, and natural language processing. He has 15+ years of practical expertise as a technology and engineering consultant applying data analysis and artificial intelligence algorithms for technology-based learning and knowledge assessment systems. Currently, he is involved as a knowledge engineer in various private and publicly funded projects.

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Senior Researcher

This presentation will report on the creation process of an ontology used for the teaching and assessment of fundamentals of medical ultrasound. We will show how this ontology was linked to educational content (lessons and assessment items) and how it was used to create a computational model to assess knowledge and skills described in the ontology.

YASMIN KAFAI

University of Pennsylvania

Yasmin Kafai is Professor of Learning Sciences at the University of Pennsylvania. She is a researcher and developer of tools, communities, and materials to promote computational participation, crafting, and creativity across K-16. Her recent books include “Connected Code: Why Children Need to Learn Programming,” “Connected Play: Tweens in a Virtual Worlds” and edited volumes “Textile Messages:
Dispatches from the World of Electronic Textiles and Education” and “Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Gaming”. She coauthored the 2010 National Educational Technology Plan for the US Department of Education. Kafai earned a doctorate in education from Harvard University while working with Seymour Papert at the MIT Media Lab.

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Leveling Up in Serious Gaming: Integrating Playing + Making Games for Learning

The serious gaming movement has sparked the development of hundreds—if not thousands—of educational games and simulations to support student learning. Accompanying these efforts have been the launch of several conferences and journals, the funding of numerous research initiatives by major foundations, and even a placement of a senior policy advisor on games and learning in the White House. There has been, however, one notable absence in examining the learning potential of serious gaming: the inclusion of constructionist gaming approaches, or those approaches in which games are made by students rather than professionals. And this absence is surprising given the successes of constructionist gaming for learning not only programming but also other content and skills. In my talk, I argue that educational gaming seriously (!) needs to consider a shift toward making games, and ultimately level up to connected gaming—those approaches that treat playing and making games no longer treated as two separate activities but overlapping, mutually informing processes for learning.

DEIRDRE KERR
ETS - Educational Testing Service

Dr. Kerr is an Associate Research Scientist at the Center for Advanced Psychometrics at ETS in San Francisco, CA. She received her Ph.D. in social research methodology from the University of California in 2014. Her research focuses on developing methods of using data mining techniques to extract meaningful features from click-stream log data from educational games and simulations and exploring the interplay between big-data computer science methodologies and psychometrics.

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Leveraging Ontologies to Extract Meaningful Evidence from Game Log Data

Log files from educational video games and simulations hold a wealth of information about player behavior, but are notoriously difficult to analyze. This is because log data consist of actions rather than answers, those actions are generally stored at a smaller grain-size than corresponding theory, and the interpretability of any given action depends on both the context of the task and the prior actions of the player. In this presentation, we introduce the In-Task Assessment Framework for extracting evidence of performance from in-task behavior that begins with a standard ontology, expands that ontology into a behavioral ontology and then a cognitively enhanced ontology, identifies relevant in-task features, and creates chains-of-evidence linking the features to the concepts in the ontology. The resulting proficiency variables transform the log data into a meaningful, interpretable format that can be fed into a variety of different models so that performance can be accurately assessed solely from in-task behavioral data.

NEAL KINGSTON
University of Kansas

Neal Kingston, Ph.D., came to the University of Kansas in 2006 and is a Professor in the Research, Evaluation, Measurement, and Statistics Program and Director of the Achievement and Assessment Institute. His research focuses on large-scale assessment, with particular emphasis on how it can better support student learning. He is the principal investigator/director or co-principal investigator of several large research projects, including Design and Development of a Dynamic Learning Maps Alternate Assessment, Development of a Learning Map Prototype with Enhanced Learning Progressions and Visualizations, and Development and Validation of Online Adaptive Reading Motivation Measures. Dr. Kingston started his career as a high school science teacher. After graduate school, Dr. Kingston worked many years at Educational Testing Service as an applied psychometrician, measurement group manager, Director of GRE Research and Test Development, and
Executive Director for Workplace Assessment and Training. As the former Kentucky Associate Commissioner for Curriculum and Assessment, Dr. Kingston was responsible for a statewide assessment system that included performance events and mathematics, writing, and alternate assessment portfolios. He worked on more than a dozen state assessment programs as vice president then senior vice president at Measured Progress. Prior to coming to the University of Kansas Dr. Kingston was General Manager and Interim Vice President of Research at CTB McGraw-Hill in which capacity he shared responsibility for ensuring that assessment products met educator needs.

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The university attains high levels of research productivity and recognizes that faculty are part of a network of scholars and academicians that shape a discipline as well as teach it. Research and teaching, as practiced at the University of Kansas, are mutually reinforcing with scholarly inquiry underlying and informing the educational experience at undergraduate, professional, and graduate levels.

ALAN KOENIG
CRESST/UCLA

As a Senior Research Associate at CRESST, Dr. Koenig's expertise is in the design and application of innovative uses of technology in instructional settings, particularly in the field of automated assessment within computer-based games and simulations. Since 2007, Dr. Koenig has managed the development of multiple US Navy-funded research projects - each involving the automated assessment of cognitively complex tasks and decision-making skills occurring in high-stakes, simulated environments. These domains have included shipboard firefighting, Combat Information Center tactical decision-making, and conning officer ship-handling maneuvering and safety. Dr. Koenig holds a Ph.D. in Educational Technology, a BS in Mechanical Engineering, and a BA in Economics.

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As the technology that drives computer-based, instructional games & simulations becomes ever more sophisticated, the models for assessing performance within these environments must also evolve accordingly. Based on an automated assessment methodology developed at UCLA / CRESST, this presentation will focus on the design and development of an automated assessment engine built for the U.S. Navy's Surface Warfare Officer's School (SWOS) in Newport, RI. Discussion will center on identifying meaningful actions; modeling relationships between content domain, simulation context, and player actions; and how an assessment engine can infer a player’s latent knowledge/abilities from the observable actions & events arising from simulation use (game-play).

ROHIT KUMAR
Raytheon BBN Technologies

Dr. Rohit Kumar is a Senior Scientist in the Speech, Language and Multimedia division of Massachusetts based Raytheon BBN Technologies. His research is focused on enriching human-computer interaction through principled design that makes it possible to employ imperfect intelligent technologies in consumer facing applications. Dr. Kumar is principal investigator for multiple projects on intelligent tutoring systems as well as technical lead for BBN's advanced speech-to-speech translation systems. Rohit graduated from Punjab Engineering College, Chandigarh and received his PhD from Carnegie Mellon University, Pittsburgh. He has authored over 50 publications on topics ranging from speech and language technology components to their application within interactive and educational systems. Dr. Kumar is a senior member of IEEE.

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Senior Scientist

Problem solving is a commonly used learning activity around which a large number of state-of-the-art intelligent tutoring systems are developed and evaluated. In this talk, we will present BBN’s problem-solving-based online learning platform and describe a series of experiments conducted between November 2014 and April 2015 to measure the pedagogical efficacy of this platform. While the platform itself is
domain independent, for this evaluation, it was instantiated with a collection of problems from the unit of Electricity and Magnetism taught in high-school-level physics courses. In addition to indicators of pedagogical effectiveness of problem solving as an online learning activity, we find compare subjects recruited for laboratory based experiments with crowdsourced subjects. Furthermore, a controlled experiment showed preference for an active help giving strategy which offers insights into tradeoffs of user vs. tutor control in advanced learning systems.

JOHN LEE
CRESST/UCLA

Dr. Lee's current research is related to technology-based assessments in a variety of military and civilian contexts. Through funding from the Office of Naval Research (ONR), he is working on the development of various computer-based tools for assessment of complex skills onboard Navy ships, including tactical training, damage control, and ship handling. He is also involved with various technical projects in collaboration with Smarter Balanced. His research interests include data-informed decision making, ontology creation and analysis, and simulation-based automated assessment.

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Researcher

Over the past ten years, CRESST has worked with the U.S. Navy with funding from the Office of Naval Research to use technology to improve the assessment of Navy personnel at all levels across multiple disciplines. This presentation will cover the simulations used by the Navy at the Surface Warfare Officers School (headquartered in Newport, RI) and its learning sites around the country. The automated assessment engine (AAE), which can provide real-time assessment of skills and subskills, will be described using Underway Replenishment (UNREP) as a specific example.

AYESHA MADNI
CRESST/UCLA

Ayesh Madni is a senior researcher at the National Center for Research on Evaluation, Standards, and Student Testing (CRESST). Her research interests include educational games, student motivation, social and emotional learning, and human learning and memory. Her current work involves students’ self-efficacy and social and emotional learning within educational games and evaluation of technology based assessments and tools. She also has experience in working as a learning specialist targeting student learning and motivation across a variety of student populations.

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Evaluation of "Dragoon:" A Systems Modeling Intelligent Tutoring Tool.

With the introduction of the Next Generation Science Standards (NGSS) and the Common Core State Standards (CCSS), computational modeling has surfaced as a key skill for college and career readiness. In response to this need, Arizona State University’s (ASU) School of Computing, Informatics, and Decision Science Engineering is currently developing an intelligent tutoring system that helps students learn computer-based systems modeling and dynamics through the skill of model construction, and by interacting with specific systems, concepts, and principles. The system includes novel technologies necessary to build a comprehensive tutoring and assessment system including domain customization, and automated interactive testing and feedback. In support of development of this system, called Dragoon, CRESST conducted two classroom field tests and evaluated the impact of Dragoon on students across two different occasions with students learning physiology and AP ecology concepts respectively. The current presentation delineates key components of Dragoon, exemplar instructional and assessment tasks, and the key findings from the two studies.

RICHARD MAYER
University of California, Santa Barbara

Richard E. Mayer is Professor of Psychology at the University of California, Santa Barbara, where he has served since 1975. His research interests are in applying
the science of learning to education, with current projects on multimedia learning, computer-supported learning, and computer games for learning. His research is at the intersection of cognition, instruction, and technology, with a focus on how to help people learn in ways so they can transfer what they have learned to new situations.

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An Evidence-Based Approach to Computer Games for Learning

Many strong claims are made for the benefits of computer games for learning, but research is needed to examine how best to design and use computer games to improve student learning. This presentation examines what the research has to say about three questions involving computer games for learning: (1) Value added approach: Which features increase the instructional effectiveness of a computer game? (2) Cognitive consequences approach: What is learned from playing an off-the-shelf game? (3) Media comparison approach: Do people learn better with games than with conventional media?

ROBERT MISLEVY
ETS - Educational Testing Service

Robert Mislevy is the Frederic M. Lord Chair in Measurement and Statistics at ETS, and Emeritus Professor of Measurement and Statistics at the University of Maryland. His research applies developments in technology, statistics, and cognitive science to practical problems in assessment. Among his projects have been design and analysis of game-based assessment with GlassLAB, collaboration with Cisco Systems on simulation-based assessment of network engineering, and, with Linda Steinberg and Russell Almond, development of an “evidence centered” assessment design framework. Dr. Mislevy’s publications include Bayesian networks in educational assessment, Automated scoring of complex tasks in computer-based testing, Psychometric considerations in game-based assessment, and the “Cognitive Psychology” chapter in Educational Measurement (4th Edition). He has received career contributions awards from the American Educational Research Association and the National Council on Measurement in Education (NCME), and three times received NCME’s Award for Technical Contributions to Measurement. He is a past-president of the Psychometric Society and a member of the National Academy of Education.

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The Case for Psychometrics in Game- and Simulation-Based Assessment

Psychometrics originated under trait and behavioral psychology, and mainly addressed relatively simple data such as selected-choice responses and judges’ evaluations on rating scales. On the surface, it provided concepts and methods to solve practical problems in this paradigm. Below the surface, however, these concepts and methods reflect deeper principles for dealing with uncertain information about aspects of peoples’ cognition and capabilities. Appropriately reinterpreted and extended, they enable us to characterize evidence for inferences cast in cognitive, situative, and sociocultural psychology, from observations in complex and interactive settings such as games and simulations. They provide a foundation for investigating validity, comparability, and fairness, which, as Messick reminded us, “are not just measurement issues, but social values that have meaning and force outside of measurement wherever evaluative judgments and decisions are made.”

IMELDA NAVA-LANDEROS
UCLA GSEIS

Imelda L. Nava, Ph. D has a strong dedication to urban education. She was a student, teacher and parent in Los Angeles’ urban public schools. As a science educator in UCLA’s Teacher Education Program, she works with pre-service and first year teachers as they obtain their teaching credential and Masters of Education Degree. She has guided teachers through science pedagogy, action research, and teacher identity. In her science education research, she is particularly interested in science teachers’ social justice dispositions and science discourse in the classroom.
Currently, as a part of the Urban Teacher Residency Program at UCLA (IMPACT), Dr. Nava is exploring science teacher effectiveness using multiple measures. She has presented her research in a variety of national and international education conferences including the American Educational Research Association annual meeting. In addition to her busy schedule, she has volunteered in many community based actions, most notably, on the Education Committee of Vecinos de South Pasadena where she served on the superintendent's focus group and assisted in ensuring all students at SPHS received A-G college admission course requirements.

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The shifts in Common Core and Next Generation Science standards present various challenges to current and emerging educators in terms of professional development, resources and transitional readiness, but they also represent an opportune paradigm shift in how K-12 students engage in instruction. During this time of transition, teachers must address and integrate the changing standards and practices, but further note that the students are also in transition and will need support to engage in this new instructional paradigm and thinking. At UCLA TEP, we have addressed the shifts in the standards by changing our methods courses so they have a greater emphasis on modeling and discourse. Further, integration is a large component of the new standards, thus, having math and science pre-service teachers in the same room for some of their experiences has been critical as well as engaging in STEM with Mobilize and NASA. There is much work to be done as we develop an emerging STEM framework to guide the integrated problem and project based experiences that the new standards demand. We do this with a firm commitment to critical thinking, reflection and social justice.

HARRY O'NEIL
USC Rossier School of Education
Dr. O'Neil's research interests include the computer-based teaching and assessment of 21st Century Skills particularly adaptive problem-solving and collaboration (or teamwork) skills, the teaching and assessment of self-regulation skills, the role of motivation in testing, and the training effectiveness of simulations and games. O'Neil has conducted cross-cultural research in Japan on the role of test anxiety and performance, and in Taiwan and Korea on the role of self-regulation and achievement.

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Professor
The mission of the USC Rossier School of Education (Ross-EAR) is to improve learning in urban education locally, nationally and globally. Rossier leads the field in innovative, collaborative solutions to improve education outcomes. Our work is field-based, in the classroom, and online, and reflects a diversity of perspectives and experiences. We pride ourselves on innovation in all our programs, preparing teachers, administrators, and educational leaders who are change agents. We support the most forward-thinking scholars and researchers, whose work is having direct impact on student success in K-12 schools and higher education. We are leaders in using cutting-edge technology to scale up our quality programs for maximum impact.

JULIA PHELAN
CRESST/UCLA
Julia Phelan, Ph.D., is a senior researcher at CRESST at UCLA. She has extensive experience and expertise directing and managing K-12 assessment projects, including planning, overseeing and managing item specifications design, item development, item pilot and field testing, and project reporting. This work has also entailed coordination and communication between multiple assessment designers, stakeholder groups, consultants, and school district personnel.

Julia's experience also includes curriculum development in math and science—at the K-12 and college level—with a focus on developing materials based on deep understanding of big ideas across the curriculum. Her recent work has integrated the Common Core State Standards in both math and literacy into multiple types of assessment format and strategies, including performance based assessments, multiple choice assessments, and formative tasks.
For 40 years, the UCLA Center for the Study of Evaluation (CSE) and, more recently, the National Center for Research on Evaluation, Standards, and Student Testing (CRESST) have been at the forefront of efforts to improve the quality of education and learning in America. Located within UCLA’s Graduate School of Education & Information Studies, CSE/CRESST has long contributed to the development of scientifically based evaluation and testing techniques, vigorously encouraged the development, validation and use of sound data for improved accountability and decision making, and aggressively explored technological applications to improve assessment and evaluation practice.

In the past few years, CSE/CRESST has grown to meet expanded needs, substantially broadening our work well beyond our historical K-12 audience. Today, our research and development serves government, military, and pre-K through college-level education and training. We have successfully scaled up our models-based accountability research to create innovative assessment and accountability systems for learners of almost every age. While our audiences have expanded, we remain committed to high-quality accountability research and evaluation methods that inform teaching and increase learning.

**JAY PHELAN**

UCLA

Jay Phelan has been on the faculty of the UCLA Life Sciences Core Program since 1997, specializing in evolutionary biology, human behavior, and genetics. He received a Ph.D. in Biology from Harvard in 1995, a master’s degree in environmental studies from Yale, and a B.S. in biology from UCLA. He is co-author of the bestseller, Mean Genes (Penguin, 2001; 2nd edition, 2013; translated into nine languages), and the author of the textbook "What is Life? A Guide to Biology" (Macmillan, 2009; 2nd ed.: 2012, 3rd ed.: 2015). He created the online adaptive testing website www.Prep-U.com, which has products for fifty courses in higher education and more than 50,000 users each month. He was the recipient of UCLA’s Distinguished Teaching Award in 2011.

**JAN PLASS**

NYU

Jan L. Plass is the inaugural holder of the Paulette Goddard chair in Digital Media and Learning Sciences in the Steinhardt School of Culture, Education, and Human Development at New York University, where he directs the programs in Educational Communication and Technology. He also co-directs the Games for Learning Institute and is the founding director of the CREATE Consortium for Research and Evaluation of Advanced Technology in Education.

**ZORAN POPOVIĆ**

University of Washington

Zoran joined the CSE faculty in the summer of 1999. He received a Sc.B. with Honors in Computer Science from

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Professor

Enlearn was founded as a not-for-profit corporation to support data-driven optimization of the learning ecosystem, including optimization of student learning, teacher effectiveness, and courseware efficacy.

**JEREMY ROBERTS**

The Incredible Pear

Jeremy Roberts is Technology Principal and Managing Partner of The Incredible Pear, LLC. Through The Incredible Pear, Jeremy partners with the CPB PBS KIDS Ready To Learn Initiative to develop innovative learning analytics tools for parents & educators that provide visibility into what children are doing and learning, identify possible problem areas, and provide recommendations for games, video, and offline activities that might help. Roberts also works with content properties such as CURIOUS GEORGE, DINOSAUR TRAIN, THE CAT IN THE HAT KNOWS A LOT ABOUT THAT! and SUPER WHY! on multiple platforms including web, mobile pocket and tablet, whiteboards, interactive tables and interactive video - as well as augmented reality for web, mobile and tablet. A physicist by training, Roberts’ experience in technology over the past 20 years ranges from bringing the AOL Entertainment, Music and Video Games channels to life in the early ‘90s, to pioneering online video and mobile content delivery for PBS in the early 2000s, to coding physics simulation software for the astronomy department at George Mason University. Just to keep things interesting, Roberts plays trombone with Washington, D.C. soul, ska, and reggae band The Pietasters, and has been known to moonlight on trombone with other artists including the late James Brown.

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Technology Principal & Managing Partner

Constructing large scale systems that help prepare kids to succeed in school and life is a journey. Start with encouraging the role that engagement, characters, and story have on curiosity and learning. Be everywhere that the kid is, and have what kids need on offer. Learn where each individual is now on “their” journey, and provide them with something useful. Provide generous supports where needed, as needed. Connect the dots between the social units and caregivers in the living room and classroom. Roberts will discuss the long range vision for learning and assessment in PBS KIDS platforms, including considerations of scale, software engineering, assessment, adaptivity, on-the-fly platform-driven multivariate experimentation, distribution, the role of tooling, and more.

**ERIC SAVITSKY**

UCLA Professor Emergency Medicine

UCLA Professor of Emergency Medicine and Pediatric Emergency Medicine, Eric Savitsky, M.D. is the Founder and Executive Director of the UCLA Center for International Medicine (CIM). An innovative educator and inventor, Dr. Savitsky has developed multiple patent-pending inventions in the medical training and health technology sector. He is a leading medical educator and clinician, serves on the advisory board of UCLA Center for Advanced Surgical and Interventional Technology (CASIT). Dr. Savitsky received a Doctor of Medicine (M.D.) degree from the University of Florida and completed his residency and a fellowship in Pediatric Emergency Medicine at UCLA. He received a Bachelor of Arts (B.A.) degree in Russian from the University of Florida and is conversant in English, Russian, Farsi, and Spanish.

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This presentation will report on the creation process of an ontology used for the teaching and assessment of fundamentals of medical ultrasound. We will show how this ontology was linked to educational content (lessons and assessment items) and how it was used to create a computational model to assess knowledge and skills described in the ontology.
JOHN SCHACTER
Math Shelf
Dr. John Schacter earned his Ph.D. from UCLA in educational psychology. Before starting his own consulting company, John served as vice president of research for the Milken Family Foundation, then adjunct professor of educational psychology at San Jose State University. Dr. Schacter has been invited to testify to numerous state legislatures on issues pertaining to teacher quality, teacher evaluation, and effective instruction. He has appeared on National Public Radio, NBC News, Radio Disney, and his research has been cited in USA Today, The Washington Post, The Baltimore Sun and other newspapers across the country. John has published over 40 research articles, is the author of three books, and created Math Shelf, the first scientifically proven tablet preschool mathematics curriculum. He was a former first grade teacher and elementary school principal.

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A substantial number of children—typically those living in disadvantaged communities—start kindergarten with inadequate mathematics knowledge. Effective and scalable mathematics interventions for low-income preschoolers are needed because math knowledge measured at school entry predicts high school academic success and future earning potential. Math Shelf is the first preschool tablet mathematics curriculum proven through a randomized trial. Children who played Math Shelf performed statistically significantly better on number sense assessments (E.S. .57) than comparison preschoolers who played the best reviewed and most downloaded 2014 pre-K math apps.

HELENA SELI
USC
Dr. Helena Seli earned a doctorate in educational psychology. At the Rossier School of Education, she teaches courses that guide students in implementing learning and motivation theory and principles to solve problems of practice. Her research interests include effective implementation of educational technology, enhancing motivation of learners in different learning environments and promoting self-regulation to optimize learning and performance outcomes. Along with Dr. Myron H. Dembo, she is the author of “Motivation and Learning Strategies for College Success: A Focus on Self-Regulated Learning” (4th edition) (Taylor and Francis, 2012).

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The University of Southern California is one of the world’s leading private research universities. An anchor institution in Los Angeles, a global center for arts, technology and international business, USC’s diverse curricular offerings provide extensive opportunities for interdisciplinary study, and collaboration with leading researchers in highly advanced learning environments. With a strong tradition of integrating liberal and professional education, USC fosters a vibrant culture of public service and encourages students to cross academic as well as geographic boundaries in their pursuit of knowledge.

ROSA SERRATORE
Santa Monica-Malibu Unified School District
Rosa is a former middle and high school mathematics teacher. In her role of district mathematics coordinator, Rosa provides leadership and training on the mathematics standards and leads the development and implementation of curriculum standards. Her mission is to support teachers in effective instructional strategies, formative assessment use, data analysis, and use of curriculum guides and resources to help anchor professional learning communities and lesson study teams that design and collaborate in mathematics. Rosa was selected by the California Department of Education to participate in the writing of the mathematics framework using the new state standards. She currently serves on the executive board of the California Mathematics Council and has recently participated in UC/CSU Mathematics Diagnostic Testing Project. Dr. Norman Webb used her local and state knowledge and expertise in a recent NAEP/ACT content alignment study. In all ventures, outstanding mathematics instruction and learning for all students is Rosa’s goal.

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RUSS SHILLING
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Dedicated to improving Science, Technology, Engineering, & Math (STEM) education across all age groups while incorporating non-cognitive strategies to encourage STEAM careers. National leader on new technologies for education and psychological health. Also devoted to autism advocacy.

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Executive Director of STEM

ED’s mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access.

ED was created in 1980 by combining offices from several federal agencies. ED’s 4,400 employees and $68 billion budget are dedicated to:

Establishing policies on federal financial aid for education, and distributing as well as monitoring those funds.

Collecting data on America’s schools and disseminating research.

Focusing national attention on key educational issues.

Prohibiting discrimination and ensuring equal access to education.

KIKUMI TATSUOKA
Teachers College, Columbia University
Kikumi Tatsuoka is a Distinguished Research Professor, Emeritus from Teacher College, Columbia University after working as Principal Research Scientist at ETS, and as Associate Professor at PLATO Lab and Department of Educational Psychology at University Illinois.
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Psychometric advances have been made in modeling how the application of various thinking skills, procedural skills and knowledge interfaces with test item responses. This area of research is known as cognitive diagnosis. Cognitively diagnostic assessment holds the promise of yielding useful and detailed information about student’s knowledge in areas such as mathematics, language, music, and beyond. In turn, this information can help in guiding individualized learning, allow for insight into how learning progresses longitudinally, and even give precise feedback with curriculum design and development.

Pioneering and fundamental research in this area has been done under a framework known as the Rule Space and Q Metrix method (RSM) (Tatsuoka, K.K., 2009, 1983, 1991). RSM has been successfully applied to large scale assessment such as TIMSS, NAEP, PSAT/NMSQT, SAT, TOEFL, State Assessment in several domains as well as tests in classrooms or E-learning settings.

It is important to note that statistical methods such as factor analysis, cluster analysis, and traditional latent classes model produce factors, clusters and classes of similar student responses, but it is often difficult to give researchers clear interpretation of the resulting groups. Measuring underlying knowledge and cognitive and thinking skills (termed as attributes) is not an easy task because it is impossible to directly observe them. But it would be very valuable to provide diagnostic profiles that include information about how well students perform on the underlying knowledge and cognitive processing skills required for answering problems.

This study shows the valuable findings from RSM analysis on the mathematics part of TIMSS administered to the 8th and 12th graders in 49 International Countries in the World and a State Assessment administered to 14,969 students of grade 7. Our focus was on the investigation of how we can promote teaching effectively the cognitive processing skills such as P5 (deductive thinking), P6 (analytical thinking), P3 (application of concepts and theories), P9 (management of processes and data), S6 (inductive thinking skills), etcetera. TIMSS data has shown that these important cognitive skills are higher in East Asian countries followed by Belgium Flemish, and Netherlands.
ROBERT TORRES

EkStep

Robert Torres, PhD, is a Senior Program Officer at the Bill and Melinda Gates Foundation serving on the Next Generation Learning team where he leads two portfolios, one focused on Games for Learning and Assessment and another focused on Competency-Based Education/Anytime, Anywhere. Before joining the foundation Robert served at the Chief Research Officer at the Institute of Play where he co-founded Quest to Learn, a games-based school in New York City.

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EkStep is a not-for-profit learner-centric, technology enabled platform to improve applied literacy and numeracy. The goal is to create a learning tool that will be available on devices such as smart phones and tablets for millions of children in their environment, be it home, school or tuition centre.