Innovation in PISA: Expert Groups

Formed in 2019, the **PISA 2025 LEARNING IN THE DIGITAL WORLD (LDW) EXPERT GROUP** is responsible for guiding the development of the innovative domain assessment for the PISA 2025 cycle. The role of the PISA 2025 LDW Expert Group is to advise the PISA Secretariat and the contractor for PISA 2025 on the development and validation of the assessment instruments, the scoring materials and the data analysis. The Group is composed of six experts in the fields of computer science, learning sciences, education technology and psychometrics. The Group convenes physically or virtually twice a year, in addition to ad-hoc virtual meetings as required.

Gautam Biswas is a Cornelius Vanderbilt Professor of Engineering, Professor of Computer Science and Computer Engineering in the EECS Department, and a Senior Research Scientist at the Institute for Software Integrated Systems (ISIS) at Vanderbilt University. Professor Biswas conducts research in Intelligent Systems with primary interests in developing learning by modelling environments for K-12 STEM education. Working with others, he developed Betty's Brain, a system where students learn by teaching a virtual agent. He has developed innovative educational data mining techniques for studying students' learning behaviours and linking them to metacognitive strategies. In all of his projects, there has been a strong emphasis on scaffolding students' learning, and preparing them for future learning. As a member of the PISA 2025 LDW Expert Group, he supports the development of assessment tasks and machine learning and analytics-based methods to study students' use of strategies in computational problem solving tasks.

Sanna Järvelä is a professor in learning sciences and head of the Learning and Educational Technology Research Unit (LET) in the University of Oulu, Finland. Her research interests deal with self-regulated learning, computer supported collaborative learning, and on-line learning processes. Järvelä and her research group are internationally recognised in theoretical and methodological advancement of social aspects of self-regulated learning (socially shared regulation in learning) and process-oriented and multimodal research methods. She has published more than 170 scientific papers in internationally refereed journals, around 50 book chapters and three edited books (with a Google Scholar h-index of 55). She is the Chief Editor in the International Journal of Computer Supported Collaborative Learning. Järvelä is the member of the Finnish Academy of Science and

Letters, the past EARLI (European Association for Research on Learning and Instruction) president, and is currently contributing to the PISA 2025 LDW measurement work, especially from the self-regulated learning perspective.

Frank Goldhammer is head of the Centre for Technology Based Assessment at DIPF, Leibniz Institute for Research and Information in Education, and full Professor of Educational and Psychological Assessment at Goethe University, Frankfurt, and the Centre for International Student Assessment (ZIB). He has been actively involved in large-scale assessments at the international (e.g., PIAAC 2012, PISA 2015) and national level (e.g., PISA 2009-2018, ICILS 2013-2018). His research centres on improving and enhancing educational assessment through digital technology. It includes innovative assessment formats (e.g. interactive simulations), the use and interpretation of process data for assessment purposes, modelling, and experimental control of response speed, as well as the assessment of digital and reading competencies. His recent research is about using process data from assessments and learning environments to give feedback that supports learning. In the PISA 2025 LDW Expert Group, he focuses on measurement issues, particularly how to obtain reliable, valid, and comparable measures of performance within digital learning environments.

Chris Piech was born and grew up in Nairobi, Kenya. When he was twelve years old, he moved to Kuala Lumpur, Malaysia where he lived until he began his studies at Stanford University. He is now Assistant Professor of Computer Science Education at Stanford University. His research focuses on machine learning to understand human learning. A member of the PISA 2025 Expert Group, he is developing and designing open-ended, complex block-based programming prototype tasks to support the forthcoming Learning in the Digital World assessment.

Ido Roll is an Associate Professor in the Faculty of Education in Science and Technology at the Technion, Israeli Institute of Technology. Previously, he was the Director of the Institute for Scholarship of Teaching and Learning at the University of British Columbia. Ido studies how interactive learning environments support students in becoming more creative, collaborative, competent, and curious learners. His research utilises a variety of methodologies from the fields of education, learning analytics, cognitive science, and human-computer interaction. He is a Steering Committee member of Learning at Scale, and an Associate Editor of Instructional Science. Within PISA, Ido focuses on designing learning resources that are used to assess students' capacity for learning. These assessments focus on the learning process as well as its outcome, and provide a meaningful window into students' sense-making, critical thinking, self-regulation, and motivation. More information can be found on his website.

Engin Bumbacher is a Hasler Professor of Computer Science Education at Teacher University Vaud (HEPL) in Switzerland. During his doctorate studies, he focused on novel technological approaches for supporting and evaluating scientific practices in K-12 science education. In a series of laboratory and classroom studies, he examined what factors influence how students reason with empirical data about scientific models, and vice versa. He further developed and implemented a new web-based technology for enabling K-12 life science students to engage in complex scientific practices. This technology integrates affordances for experimentation (with remotely accessible microscopes), data analysis, and computational modelling (with a block-based programing editor) into a single cloud-based web application for scientific inquiry. His work has been published among others in Nature Biotechnology, Journal of Science Education and Technology, International Journal of Artificial Intelligence in Education. He holds a PhD in Learning Sciences and Technology Design from Stanford University, a MSc in Neural System and Computation and a BSc in Physics from the Swiss Federal Institute of Technology, Zurich.

In 2019, the OECD Secretariat formed the **PISA RESEARCH AND INNOVATION GROUP,** which comprises senior experts in assessment to take stock of the work already achieved within the PISA innovative domain assessments and propose a way forward. The RIG is responsible for developing a roadmap recommending a path forward for the PISA programme, both in terms of conceptual innovations (i.e. future competences to target in the innovative domain assessments) and in terms of areas of methodological research and technological innovation with which to experiment in future assessment cycles. The Group convenes physically or virtually once a year, in addition to ad-hoc virtual meetings as required.

James W. Pellegrino is Liberal Arts and Sciences Distinguished Professor and Co-director of the Learning Sciences Research Institute at the University of Illinois, Chicago. His research and development interests focus on children's and adult's thinking and learning, and the implications of cognitive research and theory for assessment and instructional practice. He has published over 300 books, chapters and articles in the areas of cognition, instruction and assessment. He has served on several National Academy of Sciences study committees, including as Chair of the Committee for the *Evaluation of the National and State Assessments of Educational Progress*, co-Chair of the Committee on the *Foundations of Assessment,* Chair of the Committee on *Defining Deeper Learning and 21st Century Skills,* and co-Chair of the Committee on *Developing Assessments of Science Proficiency in K-12*. He is a past member of the Board on Testing and Assessment of the U.S. National Research Council, and a lifetime member of the National Academy of Education and the American Academy of Arts and Sciences. He is currently Chair of the PISA Research and Innovation Group.

Kathleen Scalise is a professor at the University of Oregon and director of the National Assessment of Educational Progress (NAEP) Science for ETS. Her main research areas are technology-enhanced assessments, data science at the intersection with measurement, dynamically delivered content in e-learning, computer adaptive and multi-stage testing, and applications to equity studies. Projects include research on 21st Century Skills Assessments with Cisco, Intel and Microsoft; Virtual Performance Assessments with Harvard University; and technology-enhanced assessments with U.S. Smarter Balanced. She served internationally on the OECD PISA Collaborative Problem Solving Expert Group, and for IEA's eTIMSS and ICILS for technology literacy. She has extensive journal publications and served on the U.S. National Research Council (NRC) report on assessment of the Next Generation Science Standards. She holds K-12 teaching credentials (California) for physical and life sciences, a B.A. in biochemistry, and a Ph.D. focusing on quantitative measurement from UC Berkeley.

Kadriye Ercikan is Vice President of Statistical Analysis, Data Analysis, and Psychometric Research at ETS, recently retiring from her role as a professor of Measurement, Evaluation and Research Methods in the Faculty of Education at the University of British Columbia. Her scholarship focuses on design, analysis, interpretation and validity issues in large-scale assessments of educational outcomes and research methods in education. She has conducted research on translation, language and cultural issues in measurement, validating score meaning using response processes, assessment of historical thinking, and the contribution of different research paradigms to creating knowledge and making generalisations in education research. She has been a member of the National Academy of Education Committee on Foundations of Educational Measurement, and has served as an elected member of the National Council on Measurement in Education Board of Directors. She is currently a Fellow of the International Academy of Education and Vice-President of AERA's Division D.

Xiangen Hu is a professor in the Department of Psychology, Department of Electrical and Computer Engineering, and Computer Science Department at The University of Memphis (UofM), a senior researcher at the Institute for Intelligent Systems (IIS) at the University of Memphis, and is professor and Dean of the School of Psychology at Central China Normal University (CCNU). Dr. Hu received his MS in applied mathematics from Huazhong University of Science and Technology, MA in social sciences and Ph.D. in Cognitive Sciences from the University of California, Irvine. Dr. Hu is the Director of the Advanced Distributed Learning (ADL) Partnership Laboratory at the University of Memphis and is a senior researcher in the Chinese Ministry of Education's Key Laboratory of Adolescent Cyberpsychology and Behaviour. Dr. Hu's primary research areas include Mathematical Psychology, Research Design and Statistics and Cognitive Psychology. More specific research interests include General Processing Tree (GPT) models, categorical data analysis, knowledge representation, computerised tutoring, and advanced distributed learning.

Ido Roll is an Associate Professor in the Faculty of Education in Science and Technology at the Technion, Israeli Institute of Technology. Previously, he was the Director of the Institute for Scholarship of Teaching and Learning at the University of British Columbia. Ido studies how interactive learning environments support students in becoming more creative, collaborative, competent, and curious learners. His research utilises a variety of methodologies from the fields of education, learning analytics, cognitive science, and human-computer interaction. He is a Steering Committee member of Learning at Scale, and an Associate Editor of Instructional Science. Within PISA, Ido focuses on designing learning resources that are used to assess students' capacity for learning. These assessments focus on the learning process as well as its outcome, and provide a meaningful window into students' sense-making, critical thinking, self-regulation, and motivation.

Cesar Nunes is researcher at the Faculty of Education of the State University of Campinas, Brazil and Chief Innovation Officer at Instituto Unibanco, Brazil. He has been developing and applying technological assessment tools in fields as diverse as metacognition, creativity, critical thinking, teacher attitudes, school climate, and participatory program evaluation. Such tools have been used and supported innovations on the linkage of classroom to large-scale evaluations, evolution of communities of practice, project-based learning, and implementation of policies that integrate the development of 21st competences, moral development, and socioemotional development to traditional curriculum. He has been member of groups like the PISA 2021 Strategic Advisory Group, INEP/Brazil revision of national questionnaires, Knowledge Building International, Virtual Educa, UNESCO working group for education and TIC in Latin America and Caribe.

Patrick Griffin held the Chair of Education (Assessment) at The University of Melbourne and was the founding director of the Assessment Research Centre. His work focuses on item response modelling applications in interpretive frameworks for performance assessment, problem solving, and higher order competency assessment and performance reporting. He was the measurement team leader for UNESCO in the SACMEQ project and a World Bank consultant in Vietnam, the Philippines and China. He retired from the University of Melbourne in 2015. However, he still leads several national and international studies of problem solving, literacy and numeracy, and was the Executive Director of the Assessment and Teaching of 21st Century Skills project in which he pioneered the assessment of collaborative problem solving.