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Editors

Assessment and Teaching of 21st Century Skills

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Foreword

Ubiquitous technology has changed the way people work, live, and play. In contemporary society, people use communication and information technology (ICT) to search for information, make purchases, apply for jobs, share opinions, and stay in touch with friends and relatives. In business, people use technology to work in teams, to create new ideas, products, and services and share these with colleagues, customers, or a larger audience. At the same time, contemporary society faces myriad problems that must be addressed: persistent poverty, HIV/AIDS, food security, energy shortage, global climate change, and environmental degradation. In this context, it is crucial to respond flexibly to complex problems, to communicate effectively, to manage information dynamically, to work and create solutions in teams, to use technology effectively, and to produce new knowledge, continuously. All of these are skills needed in the twenty-first century.

Technology has made profound changes in twenty-first century business and everyday life, but most educational systems operate much as they did at the beginning of the twentieth century. While contemporary business and social practices engage people in collaborative efforts to solve complex problems and create and share new ideas, traditional instructional and assessment practices require students to work individually as they recall facts or perform simple procedures in response to pre-formulated problems within the narrow boundaries of school subjects, and often they do so without the aid of books, computers, social networks, or other resources. School work is shared with and judged by only the teacher and there is little feedback to the student or opportunity for revision. Significant reform is needed in education worldwide: What is learned, how it is learned and taught, and how schools are organized. But reform is *particularly* needed in education assessment and its direct impact on teaching – how it is that education and society, more generally, can advance and measure the competencies, skills, and experiences needed by productive, creative workers and citizens.

Assessments serve an important function when they motivate students to learn, help teachers to refine their practice and develop their skills, and help education systems improve. Assessments can also be used to certify student accomplishments, evaluate the output of educational programs, measure the progress of educational

systems, and make comparisons across systems. Most often, this is accomplished with national assessments. But international assessment programs, such as the Programme for International Student Assessment (PISA) and Trends in Mathematics and Science Study (TIMSS), allow countries around the world to compare the performance of their students to other countries and reflect on and improve their educational systems.

But assessment only works if it is measuring the right things. Traditional assessment methods typically fail to measure the high-level skills, knowledge, attitudes, and characteristics of self-directed and collaborative learning that are increasingly important for our global economy and fast-changing world. These skills are difficult to characterize and measure but critically important, more than ever. Traditional assessments are typically delivered via paper and pencil and are designed to be administered quickly and scored easily. In this way, they are tuned around what is easy to measure, rather than what is important to measure. All measure individual results rather than team results. This is no longer acceptable in an economy and society where we need to develop the full potential of all our students.

Insufficient as these assessments are, relative to the needs of our contemporary society and economy, they are one of the most powerful determinants of practice in the classroom, made more so by the use of assessment for high-stakes accountability, where teachers can be fired and schools closed for poor performance. Yet the often-unintended effect of the use of these assessments is to reinforce traditional practices and reduce innovation in schools. Teachers focus on didactic instruction and drill and practice that prepare students for assessments that emphasize the recall of facts and the use of simple procedures. And many previous, well-meaning and well-resourced attempts to reform education have stumbled because they were not able to demonstrate improvement on standardized tests designed for last century's education or because teachers declined to implement them, believing that their students would do poorly on these assessments.

Assessment reform, itself, is a major challenge that requires the efforts, resources, and expertise of not only governments, but industry, academia, as well as non-government institutions. For this reason the three companies – Cisco, Intel, and Microsoft – individually and together, are committed to facilitate research and development to improve education worldwide. They share the belief that high-quality education is important to society and the economy around the world. Each company has an extensive record of support for educational improvement (www.intel.com/education; www.cisco.com/education; www.microsoft.com/education). And together, the companies have worked with UNESCO and the World Economic Forum and other partners to support the development of the UNESCO ICT Competency Standards for Teachers and the Global Education Initiative.

Based on discussions and even direct requests for support from governments and academia, a joint Education Taskforce was set up by the three companies, in the summer of 2008, to review the range of problems, issues, and opportunities in education. The Taskforce chose to target assessment reform as the key factor that will unlock transformation of the educational system across the world. The Taskforce consisted of lead education experts from the three companies (Cisco: Bill Fowler,

Andrew Thompson; Intel: Martina Roth, Jon K Price, Lara Tilmanis; Microsoft: Greg Butler, Stephen Coller, Rane Johnson). Dr. Robert Kozma was commissioned to work with the Taskforce in formulating a call to action and initial plans for a joint effort that would support assessment reform. The Taskforce was convinced that assessment reform was a difficult comprehensive challenge that no one segment of the education community or society could resolve on its own, but that requires expertise in measurement, political commitment, academic expertise, technological capability, financial resources, and collaboration with the respective institutions. So the Task Force consulted with policy makers, key academics, and assessment organizations, including experts associated with OECD's Programme for International Student Assessment (PISA) and with the International Association for the Advancement of Educational Achievement. The result was the formulation of the Assessment and Teaching of Twenty-First Century Skills (ATC21S), chaired by Dr. Barry McGaw, University of Melbourne, as Executive Director, and constituted, in its first year, of five Working Groups, that included Twenty-First Century Skills, chaired by Dr. Senta Raizen, WestEd; Methodology, chaired by Dr. Mark Wilson, University of California Berkeley; Technology, chaired Dr. Beno Czapo University of Zeged; Learning Environments, co-chaired by Dr. John Bransford, University of Washington, and Dr. Marlene Scardamalia, University of Toronto; and Policy, chaired by Dr. Linda Darling-Hammond, Stanford University. The Working Groups were charged with analyzing the range of problems that inhibit assessment reform within their specified area and specify potential solutions that can advance assessment reform. Their deliberations included input from over 250 lead researchers across the globe. In addition six pilot countries were identified, with a lead government representative on the Executive Board of the Initiative. An Advisory Board was formed that included the Director of PISA and Chair of IEA, the organization that sponsors TIMSS. The Vice Presidents of Education and Corporate Affairs of Cisco, Intel, and Microsoft expressed their leadership and commitment by chairing the Executive Board of ATC21S (Michael Stephenson, Cisco Corp 2009; Anthony Salcito, Microsoft Corp 2010; Shelly Esque, Intel 2011).

Professor Patrick Griffin of the University of Melbourne was appointed Executive Director of the project at the beginning of 2010 to carry the project forward into its research and development phase. Associate Professor Esther Care also of the University of Melbourne was appointed International Research Coordinator.

This book is the product of phase 1 of the overall ATC21S project. The white papers here have served as the basis for the project's subsequent work in formulating and developing twenty-first century skill assessments. Subsequent phases of the project attempt to add value by catalyzing the international community to identify the opportunities, challenges, issues, and barriers that:

- Are common to all
- Are of the highest priority
- Cannot be addressed by any individual project alone

The intent of the project is *not* to develop an assessment of its own. Rather, the project will provide a structure by which the international community can draw on

and share existing knowledge and create effective solutions to address the problems, issues, and barriers associated with the identified skills and foster wide-scale adoption of assessment reforms. All products generated by the project will reside in the public domain.

We offer this collection to you with an invitation to you to join us in advancing this cause. To do so, please visit the project website at http://www.atc21s.org.

Robert B. Kozma
Martina Roth

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