"21st Century Education"

What should students learn in the 21st Century?

Summary & Outcomes of Plenary I

of the Center for Curriculum Redesign

CENTER FOR CURRICULUM REDESIGN

in collaboration with

the BUSINESS AND INDUSTRY ADVISORY COMMITTEE TO THE OECD (BIAC),
***and* the OECD CENTRE FOR EDUCATIONAL RESEARCH AND INNOVATION (CERI)**

BIAC The Voice of OECD Business

OECD 50

Sponsored by:

BIAC
Foundation Henri Moser
OECD

Dates: Monday June 4 – Wednesday June 6, 2012

Location: OECD Conference Centre, 2 Rue Andre Pascal, Paris, France

Purpose:

What should students be learning in the 21st century? This session will discuss top-level changes in the school curriculum, in terms of what topics and subjects should be added, and just as crucially, what should be *removed*.

Rationale:

In the 21st century, humanity is facing severe difficulties at the societal (global warming, financial stresses), economic (globalization, innovation) and personal levels (employability, happiness). Technology's exponential growth is rapidly compounding the problems via automation and off-shoring, which are producing social disruptions. Education is falling behind the curve[1], as it did during the Industrial Revolution. The last profound changes to curriculum[2] were effected in the late 1800's as a response to the sudden growth in societal and human capital needs. As the world of the 21st century bears little resemblance to that of the 19th century, education curricula are overdue for a major redesign.

Key questions to explore:

1. ***What should students learn to be successful in the world of the 21st century?*** In light of human aspirations and economic needs, what disciplines should be learned that are not routinely so yet? Which ones should be dropped? The full triad of Knowledge, Skills, and Character will be explored, and keeping in the forefront the meta-layer/fourth dimension of: learning how to learn, interdisciplinarity, etc. Both formal and informal educations will be addressed, and the interrelationships between the two.
2. ***What are the feedback loops between the What and the How?*** For instance, what should foreign language teaching become in an age of automated machine translation? what kind of Mathematics should be taught given availability of computing power? what are we learning from the Neuroscience of education? Etc.

[1] Goldin/Katz "The race between education and technology"
[2] Aka "standards", "programmes" etc depending on the country

Participants

Below is a list of organizations that were represented at the meeting (listed alphabetically). For full list of participants, see the CCR website under Resources – CCR Plenary I.

Alberta Ministry of Education
Associazione TreeLLLe
Boston Scientific
Bristol University
Business and Industry Advisory Committee (BIAC)
Center for Curriculum Redesign
Center for Strategic Education
Creative Commons
Estonian Ministry of Education and Research (EDU)
Finnish National Board of Education
FIRST Robotics
Kellogg Foundation
OECD Directorate for Education
Ontario Ministry of Education
Pearson
Permanent Delegation of Australia to the OECD
Permanent Delegation of Japan to the OECD
Permanent Delegation of Mexico to the OECD
Permanent Delegation of Spain to the OECD
Republic of Korea to the OECD/KEDI
National University of Singapore/Singapore Ministry of Education
US Council on International Business (USCIB)
UNESCO
University of Houston
Wolfram Research

Summary & Outcomes

Setting the Context

The Center for Curriculum Redesign (CCR) is an international non-profit dedicated to reviewing, rethinking and redesigning curricula in light of the dramatic changes in the 21st century. Founded in August 2011, the Center has been organizing a global network of stakeholders from policy, research, industry and key jurisdictions to support and engage in this work. To this point, the Center has convened meetings of these various stakeholders around critical areas of study, including neuroscience and future studies, to ask the question,

"What should students learn in the 21st Century?"

The First Plenary session of the Center for Curriculum Redesign brought together a diverse group of OECD Directorate heads, member country and industry representatives, and experts in various domains including curriculum, learning sciences, and future studies.

Note: all presentations are hyperlinked on the CCR website under Resources – CCR plenary I

Charles Fadel, founder and chairman of CCR, started the session by highlighting how exponentially-improving technologies such as Artificial Intelligence and Biotechnology were crossing new thresholds. Humanity is underestimating the power of such compounding changes, which are exacerbating the stresses induced by globalization, by allowing for increased automation and offshorability. This is turns highlights the importance of rethinking "What should students learn in the 21st century?" in an age of accelerating change.

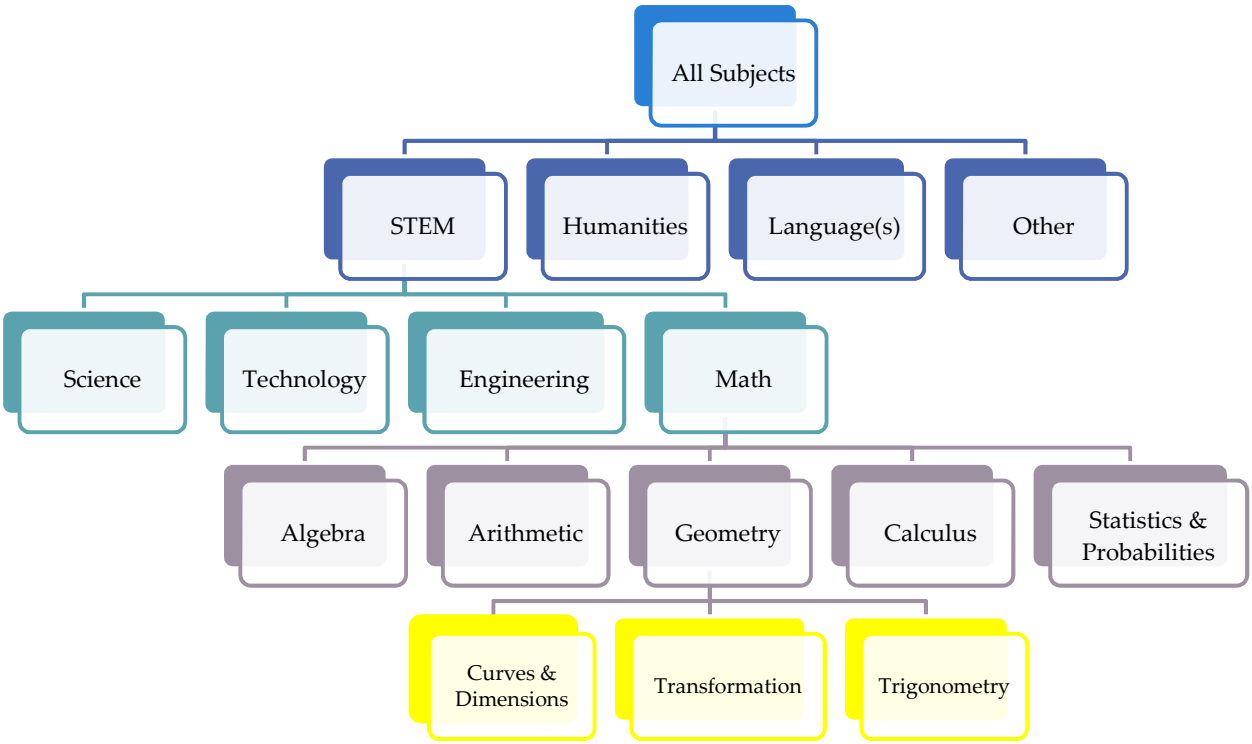
This critical need and opportunity were confirmed by Andreas Schleicher, Deputy Director for Education and Special Advisor on Education Policy to OECD's Secretary-General. Mr. Schleicher discussed how the work of the Center is critical to keeping a balanced nature to PISA (Programme for International Student Assessment), and its influence on systems of education. At the same time, a focus on skills is becoming ever more critical, and in relation to the OECD Skills Strategy he stated, "We hope that this conversation will bring schools and the workplace closer together." This includes increased attention to key elements such as global citizenry and self-directed learning—which have been shown to be highly predictive measure of future achievement, and is in fact, measurable. As such, the concept of mastery is very important, it is not just about bodies of knowledge.

Redesign and the Focus of CCR

The work of the CCR is focused at the level that has been described as the "Supra" level—the general schematic of curricula that most institutions follow.

Level		Example
Supra	International/Comparative	CCR, PISA
Macro	System/society/nation/state	National standards or curriculum
Meso	School/institution/sub-system	School- or district-specific curriculum
Micro	Classroom	Instructional plan and materials
Nano	Individual/personal	Individualized education plan (IEP)

For example, Math as a progression from arithmetic, to algebra, to geometry, to calculus, and so on; however our work will focus on the full curriculum, across all levels—even those subjects generally not covered in the existing curriculum. It is for this reason we frame our work as 'redesign'—*the **purposeful** and **strategic design** of a system structure to produce the results desired*. As such, it means everything in the traditional curriculum is open for rethinking.



Dynamic, Flexible Curriculum

Keri Facer, Professor of Education at the University of Bristol, UK described some of the challenges that need to be taken into account via careful design, such as:

- The latitude for students and teachers to explore, and adapt to, unanticipated, informal and local curricula
- The trap of assessments that narrow the scope of what is learned
- The importance of skills and character for long-term student achievement

In a modern context, a curriculum can thus be viewed as a set of principles to underpin dynamic action and interactions.

The Current State of Redesign

A central part of Plenary I was the presentation on the history curriculum redesign and the current frameworks in use in the various participating jurisdictions. These included presentations from Finland, Singapore, and Ontario and Alberta, Canada. Key themes that

emerged were the tension between national and local, a reframing of content into 'meta' aims first, and an increased movement towards competencies. Key difficulties highlighted were:

- the removal of less relevant knowledge areas
- the addition of new, more modern subjects in an already burdened curriculum
- the embedding of skills, character, and meta-layer items (interdisciplinarity, learning how to learn, etc.)
- the influence of the inevitable local political pressures.

A Core Element: Character Education

Increasing dialogue and state of affairs globally have demonstrated that moral development and character education are elements that can no longer be ignored at the Supra level. Attilio Oliva, Chair of the BIAC Education Committee and President of the Associazione TreeLLLe, presented a framing paper on this topic—serving as the foundation of shared discussion and exploration of this area for CCR. His thesis is that character education is an imperative, as knowledge and skills are not enough—they can be used in "very barbaric ways".

The View From Employers

Marita Aho of the Confederation of Finnish Industries described the importance of Skills such as communication, collaboration, critical thinking and stressed the importance of Creativity for Entrepreneurship above all, requiring:

- Divergent thinking
- Courage to grab problems
- Enthusiastic experimenting

Evidence and Current Movements of Redesign

A core element of Plenary I was the presentation of various initiatives and programmes in practice that provide evidence and support of curriculum redesign. These included:

***FIRST Robotics* by John Abele – Founder, Boston Scientific**

Robotics is a meta-discipline that brings together a number of traditional and non-traditional knowledge areas. FIRST Participants learn to work in teams to understand objectives, rules and constraints, design solutions, build, debug and compete – and collaborate – with teams from other schools. Older students mentor younger students, older teams mentor younger teams. They learn how to raise support. They learn how present their story to diverse groups. They develop videos, dances, songs, mascots to reach broad audiences. They are both confident and humble. And their culture is infectious. Citizens today need that balance of confidence and humility, of curiosity and commitment, sensitivity and thick skin, passion and perspective.

***What Mathematics do people really use?* by Merrilea Mayo – funded by the Kellog Foundation**

Most professions use no more than a solid 6th grade level of Mathematics, and only the so-called STEM disciplines require the more advanced Mathematics most high-schoolers are made to learn. This poses the question of what *types* of Mathematics should be learned, making the distinction between Mathematics, and Quantitative Literacy.

Math Redesign **by Conrad Wolfram – Founder, Wolfram Research Europe**
Mathematics is a methodology composed of 4 steps: 1) posing the right questions, 2) turning the elements of the real world problem into a math formation, 3) computation, and 4) converting that math formation back to the real world for verification. Traditional math curriculum focuses mostly on step 3, which leaves most individuals unable to understand how to apply mathematics; yet this is the step that can be most easily automated or supported through current technologies. For deeper learning and application of math, we must redesign the math curriculum to teach to the spectrum of these 4 steps and leverage technology where appropriate.

Journalism **by Esther Wojcicki – Vice President, Creative Commons**
Evidenced by the secondary program she has built in Palo Alto, California, journalism is a prominent example of how purposeful interdisciplinary study can yield considerable results in the primary disciplines (writing, statistics, etc.) as well as other desirable attributes such as relevance, global awareness, critical thinking, information literacy, empathy, ethics, communication, collaboration, digital literacy, and project-based learning.

Next, Dirk Van Damme (OECD/CERI) presented new information on the relative impact on practice- versus theory-based instruction, and the variances based on the subject as well as the type of skill to be developed. He also re-emphasized the feedback loop between the What and the How.

Lastly, Sir Michael Barber presented on the two facets of What and How:

- Regarding the What, he emphasized the importance of Knowledge and Skills; coupled with Thinking; stressing Leadership; all underpinned by Ethics.
- For the How, he spoke of "Deliverology", and the art of sticking with a needed implementation even if unpopular; the importance of entrepreneurship, and of turning a weakness into innovation.

Our Critical Task Ahead

A central challenge to this task remains in *focusing on 'What'* we teach, while providing the "interface" to 'How' we teach it. The What and the How are inherently intertwined, but most education systems focus so intently on the How that the What has been under-analyzed in recent times. The "What" remains the core mission of the CCR.

Together, we have embarked on rethinking the existing curriculum, in light of new knowledge about how we learn, what knowledge and skills we need for the 21st century, what character traits make for fulfilled individual and societies, and what world we wish for. To do this not only requires removing elements from the curriculum – a very difficult task given inertia and habits - but reframing and redesigning elements of the curriculum that we traditionally have known to be static. Our work will move at a swift pace in order to produce frameworks and resources that useable by jurisdictions and other stakeholders within 1-3 years.

The work will include the exploration of the traditional primary disciplines, but also non-traditional disciplines, dimensions of skills, character traits, and the more 'meta' competencies that direct learning across the curriculum. We invite you to join this global conversation. To do so, please register on our website at **www.curriculumredesign.org**

AGENDA

Day 1: Framing the issues	
9:00 – 10:15	*Introductions, welcome, setting the stage* • CCR & BIAC – Charles Fadel • OECD – Andreas Schleicher
10:15 – 10:45	Presentation: *What does it mean to Redesign?* – Jennifer Groff (CCR)
Break	
11:00 – 11:45	Presentation: *Exponential technologies and their impact* – Charles Fadel (CCR)
11:45 – 12:45	Presentation: *Why Standards/Curricula?* – Keri Facer
Lunch	
13:45 – 15:15	Group activity & reporting: Synthesis/finalization of Futurists table in groups, by horizontal chunk via experiences (CCR to facilitate)
Break	
15:30 – 18:00 with mini-break at 17:00	Presentations, conversations: CCR Jurisdictions (Alberta (via video at 16:00), Finland, Korea, Ontario (via video at 15:30), Singapore) – sharing progress to date, concerns, difficulties. How have they *removed* anything?

Day 2: Laying the foundation for a rethink	
9:00 – 9:30	Presentation: *What else should be learned? The importance of Character* – Attilio Oliva (BIAC)
9:30 – 10:15	Presentation: *The Oivallus project: what do employers want and need?* – Marita Aho (BIAC)
10:15 – 11:00	Presentation: *What do economies want and need? Review of the CCR Economists meeting* – Charles Fadel (CCR)
Break	
11:15 – 12:00	Presentation: *PISA's Future* – Andreas Schleicher (OECD/EDU)
12:00 – 12:45	Group activity, poll & results: *Why do we teach what we teach, and how does it change in the coming decades? What else should be learned?* (CCR to facilitate)

Lunch	
14:00 – 15:00	Continued: *Why do we teach what we teach? What else should be learned?*
15:00 – 15:45	Presentation: *Why Robotics?* – John Abele (Founder, Boston Scientific and Former Chairman, FIRST Robotics, via video)
Break	
16:00 – 17:00	Presentation: *What Mathematics do people really use?* – Merrilea Mayo, via video

Day 3: Setting the stage for innovation	
9:00 – 10:00	Presentation: *Innovation in Teaching: CERI's Innovative Teaching for Effective Learning project* – Dirk Van Damme (OECD/EDU)
10:00 – 11:00	Presentation: *Reshaping what types of Mathematics are taught, given computers* – Conrad Wolfram (Founder, Wolfram Research – Mathematica, via video)
Break	
11:15 – 11:45	Presentation: *Why Journalism?* – Esther Wojcicki (VP Creative Commons)
11:45 – 12:15	Presentation: *What does Neuroscience tell us about What should be taught?* – Jennifer Groff (CCR)
12:15 – 12:45	Group conversation: *How do we incorporate Skills, Character, and the Meta layer, alongside Knowledge?* (CCR to facilitate)
Lunch	
14:00 – 15:00	Presentation: *Why is change so needed? and how do we make it happen?* – Sir Michael Barber (Pearson, via video)
15:00 – 15:45	Group discussion: 2-3 minutes per person: W*hat should be removed? What else should be taught?* (every participant makes a case)
Break	
16:00 – 17:00	Group discussion: *How do we affect change by propagating the movement?*
Adjourn	