REDESIGNING THE CURRICULUM

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 offshoring, which are producing social disruptions. Education is falling behind the curve[1], as it did during the Industrial Revolution.

In this context, three key facets must be examined:

- What will the world be like 20 years from now? This is not about shiny objects, but about attributes along the lines of volatility, uncertainty, complexity, ambiguity, coupled with the impact of technology (internet search, artificial intelligence, recombinant DNA, etc.).

- What should schools teach, and students learn, to be successful in the world of the 21st century? Both formal and informal education need addressing, and the interrelationships between the two.

- 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? How do we improve assessments, and embed a lot more formative mechanisms? Etc.)

The last major 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. Curricula worldwide have often been tweaked, of course, sometimes to a large extent, but have never been ***deeply*** redesigned for the full triad of Knowledge, Skills, and Character, and keeping in the forefront the meta-layer/fourth dimension of: learning how to learn, interdisciplinarity, personalization, etc. Adapting to 21st century needs means revisiting each dimension and their interplay:

- *Knowledge* - Relevance required: Students' lack of motivation[3], and often disengagement, reflects the inability of education systems to connect the content to real-world *relevance*. This is also critically important to economic and societal needs, not only students' wishes. There is a profound need to rethink the significance and applicability of what is taught, and in concert to strike a far better balance between the conceptual and the practical[4]. As examples of questions to be answered: should engineering become a standard part of the curriculum? Should trigonometry be replaced by more Statistics? is long division by hand necessary? What is significant and relevant in History? Should personal finance be taught to everyone - and starting in which grade? Should entrepreneurship be mandatory? Should Ethics be re-valued? What is the role of the Arts – and can they be used to foster creativity in all disciplines?

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[1] Goldin/Katz "The race between education and technology"
[2] Aka "standards", "programmes" etc depending on the country
[3] Cortical plasticity is conditional upon relevance in humans as well as other primates (Ruytjens et al., 2006; Weinberger, 2008; Winer and Schreiner, 2011)
[4] Progression of Action → Representation → Abstraction

- *Skills*[5] – necessity for education outcomes: Higher-order Skills ("21st Century Skills[6]") such as the "4 C's" of Creativity, Critical thinking, Communication, Collaboration and others are essential for absorption of Knowledge as well as for work performance[7]. Yet the curriculum is already overburdened with content, which makes it much harder for students to acquire (and teachers to teach) Skills via deep dives into projects. There is a reasonable global consensus on what the Skills are, and how teaching methods via projects can affect skills acquisition, but there is little time available during the school year given the overwhelming nature of content curricula. There is also little in terms of teacher expertise in combining knowledge and skills in a coherent ensemble, guiding materials, and assessments.

- *"Character" (aka Behaviors, Attitudes, Values)*[8] – to face an increasingly challenging world: as complexities ramp up, humankind is rediscovering the importance of teaching Character traits such as:
  - Performance-related: adaptability, persistence, resilience, etc.
  - Moral-related: integrity, justice, empathy, ethics, etc.
  The challenges for public school systems are similar to those for Skills, with the extra complexity of accepting that Character development is also becoming an intrinsic part of the mission, as it is for private schools.

- Meta-Layer: essential for activating transference, building expertise, fostering creativity via analogies, establishing lifelong learning habits, and so on. It will answer questions such as: How should students learn how to learn? What is the role of interdisciplinarity? What is the appropriate sequencing within subjects and between subjects? How do we develop curiosity? How do we facilitate students' pursuing of their own passions in addition to the standard curriculum? How do we adapt curricula to local needs? etc.

Historical inertia has been so far a large deciding factor when it comes to curriculum design, at both the policy/process level as well as for the human dynamics involved. For policy at the system level, countries face political life-cycle instabilities that generally preclude the removal of any topic, and make it hard for any system to innovate in a radical way. At the level of human dynamics, decisions are made by subject-matter experts - e.g., math decisions are made by math experts - in relative isolation from the demands of the real-world, and thus tend to take an incremental (and perhaps overly collegial) approach.

Most of the education transformation efforts worldwide are focused on the How of education, which is laudable. But very little is being done about the What. Education much needs an innovative global curriculum adapted to the needs of the 21st century student and society. Please join us on this exciting journey!

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[5] There is no word that works equally well in all languages to convey the meaning of "Skills", which ends up being the best compromise. It could be "competencies", "savoir-faire" etc
[6] Bernie Trilling & Charles Fadel "21st century skills" 2009 Wiley http://www.21stcenturyskillsbook.com/index.php
[7] The Conference Board "Are they really ready to work?"; AMA "Critical skills survey"; PIAAC program (OECD); etc.
[8] As for "Skills", there is no perfect word that covers all meanings of "Character" in all languages; it may be "personality" in some, for instance