

Setting the stage for

“The Roundtable on Education and Human Capital Requirements”

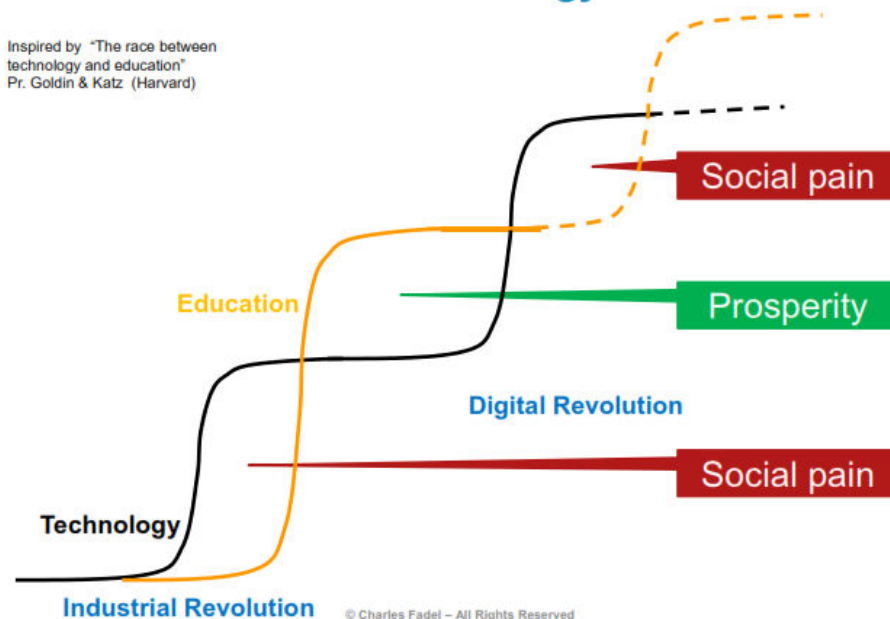
Rationale:

In the 21st century, humanity is facing severe challenges at the societal (global warming, financial stresses), economic (globalization, innovation) and personal levels (employability, happiness). What advice do economists have for educators, on how to get ahead of – and not merely catch up to – the disruptions? How do we build “economic resilience”?

Technology’s impact:

Technology’s exponential growth is both enabling and rapidly compounding the problems. Education is falling behind the curve¹, as it did during the Industrial Revolution.

The Race between Technology and Education



The first two presentations (Fadel, Meyerson) will describe the rate of change of Technology and the consequences of its exponential growth.

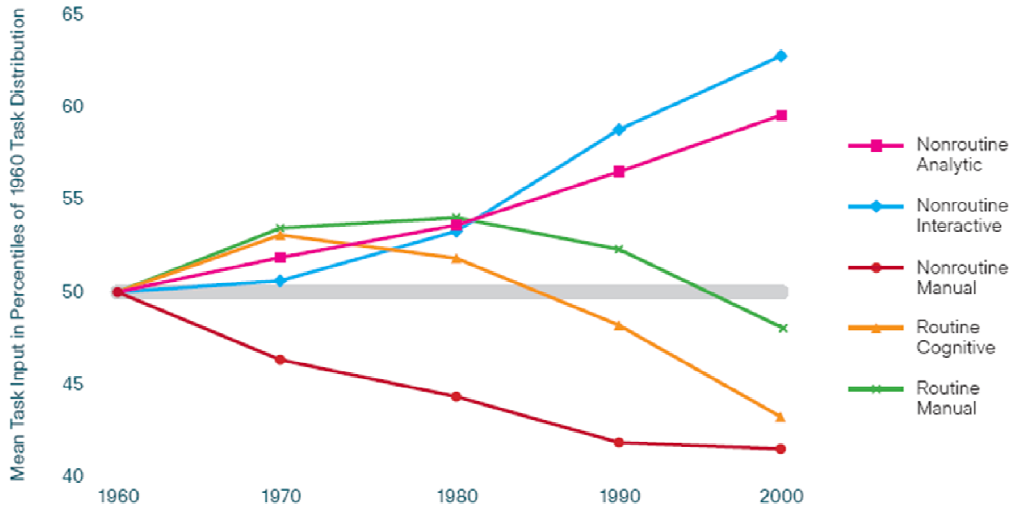
Impact of Automation and Offshoring on the demand for Skills:

Economists have been tracking the changes in relative demand for Skills², showing that Skills that are “rule-based” are easier to automate, and likely, to offshore³:

¹ Goldin & Katz, “The race between education and technology” 2008, Harvard University Press

² Levy & Murnane, “The new division of labor” 2004, Princeton University Press

Economy-Wide Measures of Routine and Nonroutine Task Input, 1960–2002



Source: Updated chart from R. Murnane in a private communication (2010). Based on Autor, D., Levy, F. and Murnane, R. (2001) "The Skill Content of Recent Technological Change: An Empirical Exploration." NBER Working Paper 8337. Boston, MA: National Bureau of Economic Research.

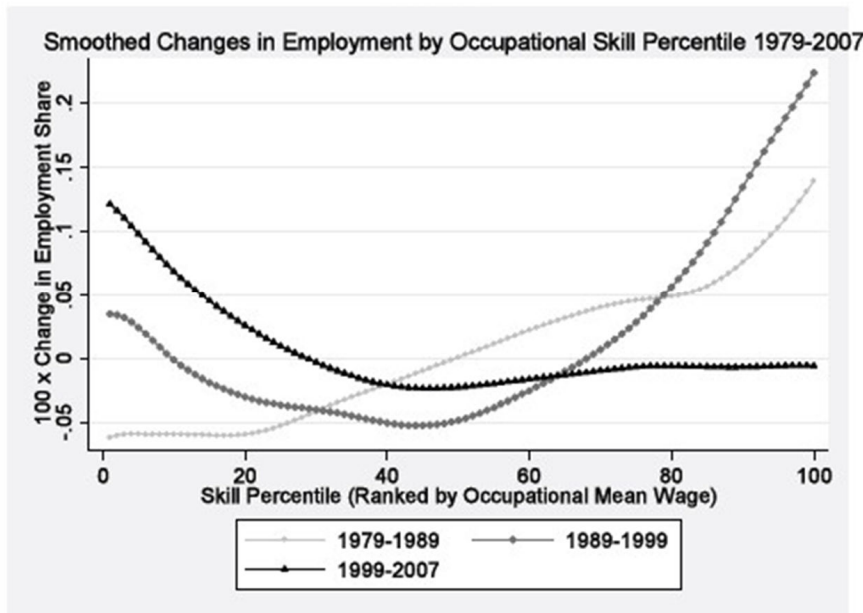
For the sake of discussion, Skills and Delivery might be matrixed in the following way below, with the caveats that they are not strictly orthogonal (witness "Nonroutine Interactive" in the chart above), and although the Personal Delivery hypothesis is considered conjectural:

Non-Routine	Non-Routine Impersonal (hard to automate, but increasingly offshored)	Non-Routine Personal (hard to automate, remaining onshore)
SKILLS		
Routine	Routine Impersonal (automated and offshored)	Routine Personal (increasingly automated, remaining onshore)
	Impersonal	Personal
	DELIVERY	

Sources: Blinder for X-axis, Levy/Murnane/Autor for Y-axis
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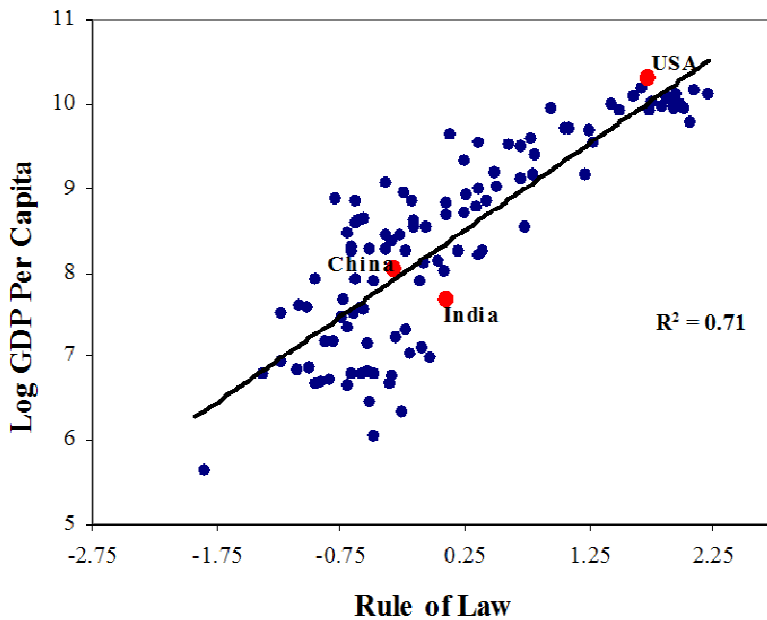
³ Blinder "How Many U.S. Jobs Might Be Offshorable?" CEPS Working Paper No. 142 March 2007 and Blinder & Krueger, "Alternative Measures of Offshorability" CEPS Working Paper No. 190 August 2009

Further, is it clear that there is continued demand for high skills? As stated by Golding/Katz⁴ and described by Acemoglu/Autor below, even high skills might be hollowing out, not just intermediate skills:



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Nevertheless, Trefler points out some of the inherent limits to offshorability, based on the strength of institutions:



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⁴ “Advancing technology does not inevitably produce an increase in the relative demand for skilled and educated workers” P6 of “The race between education and technology”

⁵ Acemoglu/Autor, NBER <http://www.nber.org/papers/w16082>

⁶ Kauffmann et al, 1999 as cited by Trefler in: www.rotman.utoronto.ca/~dtrefler/papers/Offshoring_NAFIC_For%20Posting.ppt

The next two presentations (Autor, Treffler) will analyze the impact of computing/communication/transportation on skills demand in developed countries.

At this stage, the ensuing discussion will focus on:

1. Do different models of economic analysis adequately factor in the *forward* impact of:
 - Communication & Transportation: The depth and breadth of the talent pool of developing countries?
 - Computing: The impact of Artificial Intelligence?
2. Is there a consensus amongst economists about economic transformation and the associated skills in *developed* countries? What are the limiting factors of automation and offshorability?
3. Adjacent questions unearthed during the presentations and discussion itself.
4. First pass: what should students learn in the 21st century?

STEM education, employment growth

A number of reports have analyzed the growing need for STEM graduates, to fulfill demand⁷.

In addition to fulfilling demand, are some professions more conducive to creating jobs for others? Murphy states⁸: “Our evidence shows that countries with a higher concentration of engineering college majors grow faster, whereas countries with a higher proportion of law concentrators grow slower” and⁹: “If an extra 10% of enrollment was engineering, the growth rate would rise 0.5% per year; if an extra 10% enrollment were in law, growth would fall by 0.3% per year”. Bivens also indicates the presence of a multiplier effect, stated as⁹: “Each 100 jobs in manufacturing supports 291 jobs elsewhere in the economy, compared to 154 jobs in business services and 88 jobs in retail trade.” Of course, a precursor condition must be a reasonably widespread adherence to the rule of law, as described above.

And above and beyond the demand for jobs, what is the case to be made for “STEM for everyone”, and the economic impact of quantitative illiteracy? we hear of anecdotal evidence of how “PESCO couldn't get decent welders, because the ones hired couldn't read the diagrams well enough to figure out where to put the welds”; doctors and journalists not understanding the statistics they are using in their practices; the public at large concerned about vaccination; etc.

Further, to develop Skills such as critical thinking, creativity, communication, collaboration, the Humanities have their role to play; Steve Jobs has stated¹⁰: “Technology alone is not enough... it is technology married with liberal arts, married with humanities, that yield the results that make our hearts sing”. Yet Liberal Arts college enrollment is at an all-time low¹¹, reflecting concerns about employability and relevance.

Nicole Smith will present on STEM education and employment growth.

At this stage, the ensuing discussion will focus on:

1. What are the economic arguments for enhancing the quantity/quality of STEM graduates in the overall labor supply? Is there also an economic case for STEM based on “public good” benefits?
2. Provocatively: Are some professions/fields more conducive to employment growth than others? What is the role of Humanities?

⁷ Carnevale & Smith: <http://cew.georgetown.edu/stem/> 2011

⁸ “Allocation of Talent, Implications for growth” 1990 National Bureau of Economic Research, Murphy et al

⁹ http://www.epi.org/page/-/old/workingpapers/epi_wp_268.pdf

¹⁰ Steve Jobs, iPad2 intro speech, March 2011

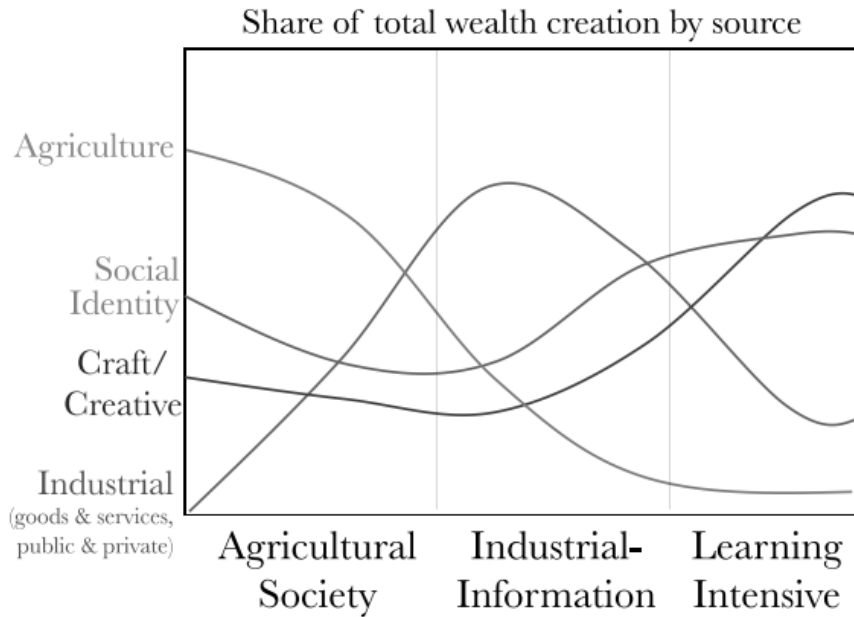
¹¹ “The proportion of undergraduate degrees awarded in the Liberal Arts has been declining for a hundred years”; Menand, “The Marketplace of Ideas” 2010 Norton

3. Adjacent questions unearthed during the presentations and discussion itself.
4. Second pass: what should students learn in the 21st century?

A post-industrial, non-neo-classical view?

Given all of the above, should we be thinking laterally as well, about alternative mechanisms for value creation? And about non-GDP measures¹² as well?

Miller will explore how economic transformation and accounting might be changing with the emergence of a non-industrial society and economy:



Riel Miller 2012

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At this stage, the ensuing discussion will focus on:

1. Provocatively: Can we even make realistic recommendations given the rate of change?
2. What further research is needed? With what continuity and focus?
3. Adjacent questions unearthed during the presentations and discussion itself.
4. Final pass and synthesizing: what should students learn in the 21st century?

¹² Stiglitz et al "Mis-measuring our lives: why GDP does not add up" 2010, The New Press; Bhutan's and France's "Gross National Happiness" <http://www.dailymail.co.uk/news/article-1213361/Sarkozy-includes-happiness-Frances-measure-economic-progress.html>

¹³ Riel Miller, XperidoX consulting