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“Start Early, End Strong”

**A contribution to the Second International Conference on the
Future of Education**

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The international norm of fostering education for those aged six through university is completely out of date. The start is too late and the finish is too early. It is time to combine three things: what neuroscience tells us about the development of the brain; our knowledge about the changed economy and our prospects for much longer productive life; and our strategies for education. Combining these factors lead to a more holistic view of education as a life-long endeavor. We also have important opportunities to improve the quality of societies by educating future adults to be less violent and more innovative citizens.

A. The Five Phases of Education

We first present an overview of what new understandings from science imply for the five phases of a desirable educated life.

Phase 1: Birth to Primary School

The single most important factor that determines whether or not any child will be educable and will be capable of success in school is the brain development experiences for the child that happen in the first three months and first three years of each child’s life.

Education can have a transformational impact on the life of a child, and society should place a very high priority on giving each and every child the right set of education opportunities—but we all need to realize and understand that children who have the wrong set of experiences in those first three months and first three years will

not have the brain power and the intellectual capacity to take advantage of the education opportunities that might exist for each child.

The basic biology is the same for every child. Neuron connectivity in the brain is necessary for each brain to function, and the time frame when that connectivity can be created and strengthened happens in the first months and first years for each child. That process changes significantly for each child after those first key years. (“Baby’ Brain Begins Now: Conception to Age 3,” Urban Child Institute, undated.)

The basic biological truth is that the brains of infants begin an actual pruning process by age four—and that pruning process functionally eliminates the best neuron connection opportunities for each child because it actually purges unused connections from the brain.

Developmental programs for children that are aimed at increasing the basic intelligence levels of a child that begin after age four begin too late to have significant impact on children.

After age four, we can and should help each child with issues of judgement, wisdom, emotional security, and interaction functions and skills, but we cannot significantly improve the basic core learning capabilities and intellect strength that result from the neuron connectivity levels in each child’s brain.

We have major learning gaps in many of our American schools today between groups of children. That has been a major area of concern for many of our communities. Average learning levels differ significantly between groups in many of our schools. There have been a large number of very well intentioned programs that have been aimed at closing those learning gaps over the past couple of decades since the gaps were first detected and measured.

We now know why those programs to close those gaps have failed in so many settings. The functional and foundationally biological truth is that we cannot close those gaps at fifteen years. We can only close them at fifteen months. We need to help each child from each group in those high opportunity time frames because we owe it to every child to give each child the best trajectory into their education experience.

We can’t close the gaps once they exist for a group of children, but we can keep those gaps from coming into existence. We can prevent those gaps from happening.

We now know that children whose brains are exercised in the first months and years of life by having caring adults talking, reading, and directly interacting in clearly responsive ways with each child, have much stronger—and even physically larger—brains by age three. (Bjorn Carey, “Language gap between rich and poor children begins in infancy, Stanford psychologists find,” Stanford Report, September 25, 2013. See also Joan L. Luby et.al, “Pre-school in a sensitive period for the influences of maternal support on the trajectory of hippocampal development,” Proceedings of the

National Academy of Sciences, 113:20, May 17, 2016. Also see Allisan Eck posting, “Stress from Poverty Decreases Brain Size – Even at Birth,” (a review article) Nova Next, March 15, 2015. And see ThreeKeyYears.org. Recent research findings are summarized by Better Brains for Babies at <http://www.bbbgeorgiz.org/recentresearch.php>).

Children who do not have adults interacting directly with them, talking directly to them, and reading books and other written materials to them have many fewer neuron connections in their brains and have both smaller and less functional brains than the children who do have those interactions.

It is important to have those interactions with each child before the age of four, because the basic biological truth for every child is that each brain changes and goes through a pruning process at age four that eliminates a very high number of neuron connections that have not been used prior to that time. Connections that have been used become part of the permanent capability of the brain, and unused connections permanently disappear.

The impact of those interactions begins immediately—even before birth. Children are born able to discern in the first hours of life that a new language they hear is not the language they heard before being born.

Several very important epigenetic processes are engaged immediately for each child. We all have our genetic composition and we have the ability of our genes to modify the function based on the experiences that we face. Epigenetic changes are important before birth, and some very important epigenetic determinations happen for each child immediately after birth. (*Ibid.* especially National Academy of Sciences paper.)

In the first weeks and months of life, children who are hungry and are fed and who are stressed and then comforted—have their brains wired in response to those positive experiences.

But children who are hungry and not fed and who are stressed and not comforted in those first weeks and months end up with a different set of behaviors and attitudes toward the world around them.

Children who have negative experiences in those first weeks and months can end up with an attitude of Presumptive Negativity—where they assume all interactions have a high likelihood of being negative.

Rhesus monkeys go through very similar processes based on their experiences immediately after birth and the young monkeys have similar negative interaction patterns and tendencies.

Researchers at Columbia University have been able to film and measure less than ten minutes of mother/child interactions at one hundred days old and those researchers have been able to predict with an extraordinarily high level of accuracy which children will have learning problems and emotional attachment challenges at three and five years old. (Beebe, Cohen and Lachmann, *The Mother-Infant Interaction Picture Book*, WWNorton, 2017; also see review of this and other research on “Mother-Child Relationships to Infant Brain Size on the April 29,2017 blog of the Institute for InterGroup Understanding <http://www.intergroupInstitute.org/blog/author/admin/>)

A number of studies have now shown that the children who have fallen behind in those key areas by the time they reach kindergarten, tend to never catch up with the other children in their schools. (Julia Isaacs, “Starting School at a Disadvantage: The School Readiness of Poor Children,” The Brookings Institution, March, 2012.) Those children who have fallen behind by that point are far more likely to drop out of school—in part because school can be hard and unpleasant for students who cannot read.

A very high percentage of the students who drop out of high school end up with serious health problems. The health status of drop outs tends to be significantly worse than the health status of graduates. (This finding is one made in a number of studies, e.g., Vaugan, Salas-Wright and Maynard, “Dropping out of School and Chronic Disease in the United States,” *2 Gesundh Wiss*, 2014, Jun822(3), 265-270 found in <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4164164/#!po=32.7586>)

The drop outs are also much more likely to go to jail. That is true for children from every group.

For African American males without a high school diploma, “There is nearly a 70% chance that..they will be imprisoned by their mid-thirties.” That compares to under ten percent of the high school graduates. (See evidence from the Hamilton Project of The Brookings Institution.) Ten percent of a horrible number and sixty percent is far worse. We can predict with an extremely high level of accuracy at age three which African American males (or members of most major groupings in the U.S.) will be going to jail because we now know at age three which path each child is on

Education levels are extremely important predictors of both health status and incarceration. Drop outs have higher teen pregnancy levels, higher rates of drug use, higher rates of asthma, and even higher rates of diabetes and heart disease . (Vaugh, et.al. op.cit.)

The trajectory to better or worse health, and the trajectory to employment or incarcerations is heavily influenced by the first months and years of life for each child—and we need to take those factors into consideration in determining education policy and strategies in all countries.

We need a world-wide program to teach that information to every family, parent, and community, because the new science is not known in most settings and the people who

want their children to have better lives deserve to know what they can do in basic ways to make their children's lives better.

Those issues are particularly important right now because we live in a world with many regions facing active inter group conflict and war. More than 65 million people are in exile right now from their home countries and millions more continue to live in war zones. We need to pay particular attention to the impact of war zone experiences on the first weeks, months, and years of life for each child. (“Growing Up in a War Zone Permanently Damages Kids’ Brains,” UNICEF news release, March 24, 2016; “One in Nine Children Being Raised in War Zones,” UNICEF news release, May 7, 2016. See also “Safe Spaces: Protecting Brain Development in Emergencies,” www.TheirWorld.org)

We need our care teams, our communities, and our families in war zones to all understand how important it is to give our children in those settings the sense of stability and safety they need to do well when those epigenetic processes are activated for each child. We should also predict as economists that future work force and health care realities will be damaged due to those factors.

All of these factors call for educating new parents to start early in the education of their child, and it calls for school systems to institutionalize very early “pre-school” education systems. Italy is an interesting positive example, now starting schooling at age 3, which is much better than systems that start at age 6...although by our reckoning still late.

Phase 2: Primary through High School

When the world's education ministers met in 1990 and again in 2000 they focused strongly on universal basic (i.e., primary) education. At the 2000 meeting for which co-author Berg was senior advisor, his attempt to interest the education ministers in early childhood education was not successful. In the years since the emphasis has shifted from quantitative expansion of primary education to increases in the quality of primary education.

But let us assume for the moment that children get good birth-to-primary school preparation to learn. What happens then? We now know that if early childhood education gains are not well followed up in primary education, those gains will be lost. Indeed, experts on early childhood education, call the first years of primary school the new frontier of challenge for excellence. (See “The Current State of Scientific Knowledge on Pre-Kindergarten Effects,” Brookings Institution Report and Conference 4/17/17)

Knowing what we now know from education linked to sound brain development (in part from the Mother Service Society's early childhood schooling programs in Pondicherry, India), a realistic goal for students with a recommended early start in learning would be for students by age 7 to be able to learn how to learn. This means competency in using hard and soft data to research issues in their education and, of course, facility in the use of computers. This point relates directly to the economics of education. While adding early childhood and early formal education programs to national systems will increase the education budget, teaching children to research well will reduce the costs of education later on. And, as noted above, better educated early education will result in less expenditures on criminal control, and health programs and much higher earnings. Indeed several studies on the economics of early education show a sizeable net economic benefit to society.

There are many implications for secondary education, but we will focus here only on one. Prior to secondary school graduation, students should be exposed to the basic lessons of responsible parenthood including how to teach their future very young children to learn.

We make two observations about formal grade school systems. First, there is a lot of experimentation and innovation going on in education around the world. Much of this is valuable. But, second, formal school authorities are very slow to adopt the best innovations in learning...and this is often compounded by inadequate training and sporadic or missing upgrading of teachers. Effective public administration incentives for changing systems and using good innovations are badly needed.

Phase 3: Tertiary and Vocational Education

The World Academy and this conference focus a good deal on higher education, with particularly interesting findings on the merits of a mixture of distance and 'bricks and mortar' based education.

There has been much less focus on vocational education and the economic incentives to make hiring labor more competitive than paying for new capital equipment. Famously, Germany presents an outstanding example of strong national and local policies to foster vocational education tied to the needs of its job market. This is certainly a model for wealthier countries. But we do lack viable models of vocational education for less wealthy economies and this is a true challenge, particularly in economies that have low growth.

Some believe that the answer is to foster micro-enterprises, but budding small business entrepreneurs require training, too. We note that while some leaders of the development evaluation field...e.g. Esther Duflo and Dean Karlen...have raised doubts about the efficacy of micro-finance programs, there is general support for technical assistance programs for micro-enterprises.

Phase 4: On the Job Training

Unfortunately, for a variety of reasons...particularly the unrooted mobility of capital as well as the rise of artificial intelligence and robotics...stable employment in middle income and higher income countries is seen as increasingly difficult. Indeed: “The risk of holding a poorly paid, precarious or insecure job is higher today than it was in 1995.” (United Nations, “Report on the World Social Situation 2016, p. 2) And this risk is much higher for youth in all categories of countries, including the wealthy.

The question is ‘how is labor valued,’ and this turns out to have an important cultural dimension. A survey of top managers in several OECD countries asked what they felt was the peak age for the productivity of their workers. Managers in the US and Europe the productivity of their workers peaked in their young 50s. In Japan it was age 44. In Taiwan it was age 38. An implication is that managers are more prone to stop upgrading their workers’ skills if they feel their workers are past their prime.

The issue of preserving and enhancing workforces is so important it has become a security issue. The US National Intelligence Council’s 2017 “Global Trends” report says the following:

“Initiatives to provide continuous workforce education, enable a mobile and secure workforce, and preserve technology leadership in multiple disciplines will enhance the resilience of states to potentially disruptive advances in technology, such as automation, data analytics, artificial intelligence, and biotechnologies. Such resilience would mitigate the near-term risk to jobs and markets, and allow the technologies to produce greater economic efficiency and productivity over time.”

The report goes on to recommend more public-private continuing education, and the development of curricula by universities in consultation with employers to upgrade workforces. All this is seen as necessary for economic progress and social stability.

Fortunately there are positive examples of training when technology changes occur. “Energy companies have begun to figure out how to retrain workers over the course of their careers as jobs in power plant control rooms and on production platforms shift towards the overseeing of automated systems.” (Vice and Yanosek, “The Next Energy Revolution,” *Foreign Affairs*, July/August 2017, p. 131)

The Academy could very usefully compile and discuss how to foster an evolving responsibility of societies to help people keep jobs, let alone obtain them. It would be particularly useful to know which countries at various income levels are doing well in retaining employees.

We believe that good early childhood education can echo in improved workforces. For example, early experiences in socialization and team work, in finding creative solutions, in taking pleasure in eye/hand coordination tasks, can lead to workers who

better problem solve and who help raises the productivity of the organizations within which they work.

Phase 5: Education for the retirement years.

Many years ago one of us met with a group of men in Bangladesh who complained that their pension plan (then a rarity) came on line at age 55, five years after the average age of death (!) Today the average lifespan for men in Bangladesh is over 70 years of age, somewhat above the world average. (World Health Organization, 2016). So now in many countries of the world ranging in income from Bangladesh through OECD countries, people who have worked and been able to save or who have pensions are able to contemplate many years, often 15-25 years, of capable life after they retire. Currently those years are most often of little use to society. So the question is whether much more socially useful post-retirement years can be achieved. Most retirees, i.e., those who served in special purpose governmental or corporate institutions, are ill-prepared to give back to society in their retirement years. So a new field of education is just beginning to emerge.

At the elite level is Harvard's Advanced Leadership Initiative, started in 2009 and the only program in the 381 year history of the university that bridges all its graduate level professional schools. Topflight retired leaders of organizations (most from high paying corporate positions) are assumed to know how to run organizations. They are now taught how to help change large social issues. For most of these very capable students, this is brand new learning. The quid pro quo for being in this one-year program is that graduates must start an initiative that is intended to favorably address an important socio-economic problem.

The Harvard program could usher in a new generation of university students: people in their late 50s or early 60s, just at a time when the university-age populations in many countries is declining. To many universities this will be a wonderful opportunity to add revenues and fill out their campuses with students.

In many countries short term courses rather than expensive programs like Harvard's, could be devised to help people be more productive volunteers, to learn the art of political advocacy, and to teach how to mentor. In Mozambique one of us urged the country to take advantage of retired civil servants ("for lunch money") to volunteer as teachers at a time when there was an acute shortage of teachers.

B. Two Key Cross-cuts

Good educators have clear societal goals for their educational programs. These are important to consider and update from time-to-time. There are two dimensions of future

education we believe should be added to national educational goals: educating for less violent societies, and education for creativity, particularly for innovation for the public good.

1. Fostering less violent societies.

“What begins with the failure to uphold the dignity of one life all too often ends with a calamity for entire nations.”
Kofi Annan, Nobel Lecture, December 10, 2001.

The general evidence is that most children, in numerous countries studied by UNICEF covering all regions, experience violence against them. UNICEF has compiled the evidence on the proportion of children aged 1-17 who experienced any physical punishment and/or psychological aggression by caregivers in the month prior to the surveys. In the vast majority of countries (i.e., 53 of 64) studied, the prevalence rate of such violence was over 60%, “with a prevalence rate of over 90% in 12 countries” including Ghana, Tunisia, Egypt, Palestine and the Central African Republic. The lowest prevalence rate was Cuba’s with a still shocking rate of 36%. (UNICEF data from their MICS and DHS data surveys reported in *SDG 16 Progress Report*, Institute for Economics and Peace, Sydney, September 2017.) Children who are at the receiving end of aggression in the large number of societies where this is “normal” are already being socialized to understand that aggression is normal.

Learning to live a more peaceful life is a major challenge for humanity. The first step in creating a less violent world, like the first steps to so many of the issues discussed in this paper, is to train expectant parents to be far wiser in their parenting. Known factors for young children in fashioning more humane citizens include acceptance by their parents. (Valeeva and Kalimullin “Effects of Parent-Child Relationship on the Primary School Children’s Non-Violence Position Formation,” *International Journal of Environmental and Science Education*, Vo. 11. No. 13, 2016.)

Another fundamental factor is early exposure to people from different backgrounds. As a distinguished study by top experts on diversity, states: “Expanding the comfort zone beyond same-race companions and friends (or other similarities such as culture, ethnicity, religion, nationality) to include cross-race interactions is an important challenge and the obstacles begin at 3 months of age.” (Jones, Dovidio and Vietze, *Psychology of Diversity*, Wiley Blackwell, 2014.)

Early childhood educators often have solid ideas on how to educate for less violence. The early childhood teaching goals recommended by one widely used text (*Anti-Bias Education for Young Children and Ourselves*, Derman-Sparks and Edwards, 2010) sets these four anti-bias goals:

1. Each child will demonstrate self-awareness, confidence, family pride, and positive identifies;
2. Each child will express comfort and joy with human diversity; accurate language for human differences; and deep, caring human connections;
3. Each child will increasingly recognize unfairness, have language to describe unfairness, and understand that unfairness hurts; and
4. Each child will demonstrate empowerment and the skills to act, with others or alone, against prejudice and/or discriminatory actions.

As in other areas of education, there must be follow up throughout education if we are to curate a society that is less violent and more caring. There are also key tasks for societies (particularly those centers of mass media -- Hollywood, Bollywood, Nollywood and Rollywood) to reform mass media to reduce the popularization of violence in movies and videos. Numerous reform initiatives have received support by media leaders, but very little has changed, and arguably violence is increasing in mass media.

It is time to bring the world's educators into the initiatives to reduce violence in societies.

2. Education for creativity for the public good

Our contemporary society does a fine job in fostering creativity for private gain. There are excellent MBA programs found in good universities all over the world. We would argue this is an imbalance for society's needs. There is increasing recognition of the need for creativity to help solve numerous problems to enhance the public good, just at the private sector strives to be creative to serve the private good.

Two strategies can promote creativity for the public good.

The first is augmenting existing curricula to expand horizons towards enhancing the public good. Swarthmore College in the U.S., for example, is actively soliciting ideas to strengthen curriculum and programs to enhance social impact. The renowned brother of WAAS Fellow Lloyd Etheredge, Lynn Etheredge, has proposed six new courses for Swarthmore: A review of great revolutions and social movements; the science and practice of contemporary democratic social change; designing and accelerating a world of human flourishing; digital technologies to transform our future; studies in effective social change; and systems thinking and its many uses. (Discussion Draft, May 29, 2017).

While we applaud the approach of augmenting regular education by special courses that will stimulate people towards being social change activists, we also believe that more fundamentally we need to create the equivalence of MBAs for social change experts. Perhaps this would be an MSE, a Masters in Social Enhancement. The elements of such a program should be introduced early and honed in the MSE program. Arguably, the world's leading experts on social change (especially social entrepreneurship) are found at Ashoka, by far the most significant global networks of successful social entrepreneurs, some 5000 in number. Ashoka assessed the ventures of their Fellows that have operated for five or more years and concluded that 80% have had their solution implemented by others; 59% have directly influenced national policy; and that each Ashoka fellow is helping an average of 174,000 people.

Ashoka believes that everyone should be a social innovator and that, based upon the lives of their Fellows, there are four values that need to be inculcated in our young: empathy, teamwork (open teams to see and seize ever-changing opportunities), new leadership (in which every person on a team looks at the big picture and advances solutions contributing to positive social outcomes), and change-making (the capacity to freely and effectively innovate for the good of all).

Beyond reforming education, governments and global institutions...as well as academies like WAAS...have an opportunity to foster better solutions while inculcating a more democratic spirit of problem solving, if they approach solving problems differently. Currently, the primary way that solutions are found is through small, navel-gazing meetings and individual efforts. The more interesting way to find solutions to specific problems is through open systems such as Open Source Competitions. Occasionally the UN and major firms like IBM have run open source competitions in which a very large global community is asked to contribute ideas (on open platforms) to specific problems. Not only is much more creativity developed, but a much wider constituency for solving the problem is created. And stronger legitimacy if given both to the sponsoring organization and to the ideas they promote...if the process is demonstrated to be inclusive, tapping into (e.g.) all the scientific academies and networks of social entrepreneurs.

Training a new generation to work in open systems to help promote public well-being, and demonstrating by example the use of such systems will, we believe, add to the quality and political support of better ways of solving challenges.

C. Conclusion

In sum, what we are advocating is a much more holistic approach to education, appropriate for each stage of life, from birth onward. We believe that the substantive and policy case still needs to be made in most societies for many parts of this holistic

approach and we further believe that the Academy could help stimulate countries to think more systematically and holistically about education of their peoples.

One reason that vital pieces of education are missing to create continuously growing and meaningful lives, is that there is little evidence of effective conceptualization of lifelong learning, and only limited and fragmented responsibilities for policies and programs that create a continuum of continuously improving education services appropriate for each stage of life.

There is a serious challenge to education authorities to have an oversight of this whole process, striving to improve it, to embrace all peoples, to meet a wide variety of needs, and to keep solidarity with the needs, potential and opportunities for added worth for the lives of their citizens.

At the global level, it is increasingly important to highlight successes in educational reforms along the above lines as countries learn best from peer learning. But we also have to recognize that most countries are still striving to meeting lower level educational goals, let alone embracing mid and later life educational needs. And there are even fewer examples of nations working conscientiously to foster less violent and more socially productive societies. There are thus many opportunities to pioneer educational reforms along the above lines.

Some years ago the World Academy held a fascinating conference to discuss the Future of Human Potential. We believe there is a serious gap between what is education now and what human potential could become...a gap that if narrowed would make a great deal of positive difference for the future of humanity.

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