

## **EDUCATION, THE KEY TO DEVELOPMENT: LESSONS FROM INDIA**

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It is a great pleasure to be part of this enlightening discussion on models of higher education for the Arab world. In this talk I would like to give my perspective based on lessons from India and highlight the coupling between education and development. The description of the Indian education system will be very brief as I wish to use it as an example to foster discussion and raise questions. Other speakers, far more knowledgeable than me, have discussed aspects of education systems in the Arab world. My overall aim is to highlight the following issues:

- 1) The need for institutions of excellence. Why these are crucial for development.
- 2) How did institutions of excellence succeed [can succeed] in an environment like India's which has many similarities with the Arab world.
- 3) The urgent need for developing, in a balanced way, the full range of educational institutions from K-12 to college to research institutions. These should serve the entire population and not just the elite.
- 4) The strengths and weaknesses of the Indian education system and lessons one can learn from India.

I would like to start by stating the goals of education in a "knowledge society".

- Creating an enlightened, literate population
- Fostering life long self-learners
- Developing a skilled work force
- Training good school/college teachers
- Nurturing research scholars
- Creating leaders, strategic thinkers, planners and implementers

Similarly, to create the environment necessary for development leading to a knowledge society it is essential that countries have good

- Health care systems
- Education systems
- Jobs commensurate with rising skills
- Governance
- Internal and external security

Today in the Arab world, and in fact in most of the developing world, these five prerequisites are missing for the majority of the population. In fact, in many developing countries even basics like food, water, clothing, housing, sanitation and electric power are not available to the majority. Consequently, in almost all conferences, discussion on one issue leads to a discussion on all. Very often participants go home with a chicken and an egg problem – which issue does one tackle first? My contention is that these issues go hand in hand and progress in one leads to progress in all almost simultaneously.

Assuming that the basics requirements for survival (food, clothing, and shelter) have been

met the word “development” will be used as a mnemonic for progress in the five areas listed above – which I will call the five pillars of development. Of these, this talk focuses on education.

The five pillars are not independent. Today, we understand the many linkages between them. For example, education, especially of women, is the key to planned, healthy, and forward looking families. Education and health play a very important role in the development and security of nations. Recent major international studies and important decisions highlight many traditional and non-traditional linkages. Examples include the December 2001 report by the United Nations Commission on Macroeconomics and Health makes explicit the connection between development (macroeconomics), health, and investment in health care (This 2001 report by WHO is available at <http://www.who.int/whosis/cmh/>); the UN Security Council, for the first time ever on 17 July 2000, declared HIV/AIDS a threat to international security; the Security Council resolution stresses "the importance of a coordinated international response to the HIV/AIDS pandemic, given its possible growing impact on social instability and emergency situations" (<http://www.un.org/News/Press/docs/2001/sc7086.doc.htm>); the National Intelligence Council report of September 2002 (<http://www.odci.gov/nic>) dwells on the emerging HIV/AIDS problem in five countries of strategic importance that have large populations at risk for HIV infection – Nigeria, Ethiopia, Russia, India, and China; and President Bush, on 27 May 2003 signed the Emergency Plan for AIDS Relief Act – a five-year, \$15 billion initiative to fight the AIDS pandemic in the most afflicted countries of Africa and the Caribbean. In his words it sends a clear statement to the world that "HIV is here; that we have to do something about it; that treatment is possible and we're calling upon other developed countries of the world to join us." (<http://www.whitehouse.gov/news/releases/2003/05/20030527-7.html>)

The problems are so large that, in addition to government action, progress on any of the five fronts requires very concentrated bottoms up approach. There has to be an unprecedented public-private partnership. I would also like to stress that solutions will emerge as accumulation of small steps. We should not wait for “miracles” or “silver bullets” but act to create, and build on, small opportunities. As highly educated individuals we can influence, of these five issues, health care and education the most.

In a knowledge society a nation is poor not because it lacks natural resources but because it lacks a critical size of skilled and educated labor force, good teachers and scientists, research in its universities and industry, infrastructure for absorbing and generating technology, and entrepreneurs to create jobs. The Arab world, like many developing countries, has fallen behind in technical and scientific knowledge, in skills, and in institutions to create them.

### **THE ARAB WORLD IS NOT ALONE:**

The 2002 Arab Human Development report is a remarkable document. As iterated many times at this conference it is remarkable not because it says anything that most academics familiar with the Middle East did not already know, but because it says it in print for the

first time. Arab intellectuals have put the problems down on paper after a careful self examination and challenge the reader to find solutions. Unfortunately, the report is weighed down by a number of very serious issues:

- Middle-East politics and conflict dominates the thinking.
- Urgent need for political change is manifest. Most Arab countries are governed by repressive authoritarian governments.
- The solution has to be Pan-Arab in nature, with a key role for the Arabic language even in higher education.
- The education system must create niches of excellence that provide jobs and revenue for further investment
- Development must lead to a balanced and equitable interaction with the outside world and preserve the cultural heritage

There is no question that Middle-East politics and conflict is real and devastating. The situation in Palestine continues to haunt and terrify not just the Arab world but the whole world. I am not competent to address this issue, however, what I would like to emphasize is that the Arab world is not alone – each of the developing countries is struggling to erect the five pillars. For example, barring the issue of Middle-East conflict, the authors could have easily substituted India for the Arab world and the report would have been largely valid. So, before moving on to lessons from India I would like to briefly give my perspective on the other four issues.

The parts of the developing world in most serious trouble are all of Africa, Middle-East, Central Asia, South Asia, Myanmar, Cambodia, and Western China. In short, more than half the world's population is in deep trouble. Their future is bleak. Each one of these regions is failing because the five pillars of development are either missing or highly underdeveloped. All the nation states are recent (most gained independence post World War II), and are trying and being pushed, with various degrees of success, to jump from an agricultural and feudal society to an industrial and democratic (or at least participatory) civil society overnight. Each of these regions is still witnessing an unacceptably large population growth. Each of these regions is experiencing increasing water shortages and pollution. Corruption is very high and implementation of law and order poor. None of these regions have any substantial industry that can compete in the global market (I discuss India later), so sale and exploitation of natural and human resources continues to be the dominant foreign exchange and revenue earner.

On the other hand the West has phenomenal overcapacity for industrial production. Concentration of finances and talent (the West employs roughly 90 percent of the world's scientists and engineers with post graduate degrees) implies that most of the innovations will occur in the West. So competing with the West is very hard and nations that wish to compete must create very special circumstances. The clash of the largely subsistence economies of this extended developing world with the highly developed industrial economies of North America, Western Europe, the Asian Tigers, and Australia (collectively called the West) in a globalized world makes the need for change (erecting the five pillars of development) urgent. The need to develop niches of excellence or areas of comparative advantage is also urgent – most of the developing countries have only as long as their natural resources last if they are not to become, or stay locked as, large pools

of cheap labor. My pessimistic view is that, if very major changes, implemented by governments and/or by the public, do not occur soon even this window of opportunity will close in the next twenty years. Most of the developing world will fail – the land and water resources will deteriorate to extreme levels, and even if democratic governments are elected they will soon become dysfunctional and over time they will not be able to pay salaries or recruit qualified employees. Even the existing education, health care and infrastructure services for the general public will collapse. Under these circumstances it is very likely that authoritarian, repressive governments will remain the norm. This pattern is already evident in most of Africa and Asia – 80-90 percent of the population lives in poverty or in barely subsistence mode and serves the top 10-20 percent. Without major societal changes, this pattern will either solidify or the security and stability of current nation states will be threatened. My forecast, based on an understanding of the current situation, is that a business as usual approach will not be sufficient to prevent many more nations from failing.

My purpose in stating this highly pessimistic view is to highlight the point that the Arab world is not alone in terms of problems and impediments to development. For example, the impact of HIV/AIDS alone on the 700 million people of Sub-Saharan Africa is going to be no less drastic than the impact of the Middle East conflict on the Arab world. The advantage the Arab world has is OIL. If it invests its oil resources wisely, it can make the transition – create good education and health care systems, modernize and develop. While the Persian Gulf has almost all the proven reserves of “cheap” oil that will last beyond the next 20 years, the window of opportunity for the Arab world too is not much larger. Without major changes, internal and regional strife will keep the Arab world in the same precarious position. The West may act militarily to secure these oil reserves as it cannot afford to let them fall into hostile or even unfriendly hands unless alternate sources of energy are found. With structural changes, especially in governance, oil offers, amongst all the developing countries, the Arab world the best chance to modernize.

Having given an overview to provide a context for my concerns, I can now make the connection to the first half of the title of my talk – education is the key to realizing this opportunity for development. The questions we have to ask are – can the Arab world put into place, over the next twenty years, an education system that yields the goals that I stated at the beginning of this talk? Does it have the perseverance to invest in the infrastructure for providing quality education and health care to its full population over the next twenty year even though the benefits may take much longer to surface? If it wants to make such an investment, what lessons can it learn from India?

## **THE INDIAN EDUCATION SYSTEM**

I will first briefly describe the Indian education system, its centers of excellence, and the niches India has created for itself in the global economy before moving on to the lessons we can learn from it.

The K-12 schools are divided into three categories – primary (I-V), upper primary (VI-VII), and high (IX-XII). Colleges are affiliated to universities. Universities are of three

kinds – universities (unitary and affiliated, state and central), deemed universities, and institutes of national importance. Details of the educational structure, the institutions and their organization can be obtained from the Ministry of Education website <http://education.nic.in/>.

Education, like health care, is a state subject. Each state has the power to create, accredit and fund schools and universities. At the same time a number of schools and universities are run directly by the central government, creating a dual management system. While many technical schools and colleges are managed and run by private organizations, even those affiliated to government universities, almost all universities are government funded and run. At the apex of the system are national research institutes.

Since independence, India has made tremendous progress in enlarging its education system as shown in Table 1 taken from <http://education.nic.in/htmlweb/edusta.htm>. In spite of the remarkable growth many important overall issues remain. The ones I am most concerned about are

- The slow rate at which quality education (even in primary schools) is reaching rural India, especially to the poor and marginalized communities.
- The dropout rates in rural government schools are very high. Only about 30% of children go beyond eighth grade and only about 15% graduate from high school (grade XII).
- The highly uneven quality of education between urban and rural India, and between private and government schools makes it very hard for rural students to find admission to good universities or decent jobs.
- The disparity in investment in education between states is large. For example, Bihar which continues to be at the bottom of the development chart with 83 million people, allocated Rs. 434 per person for 2003-04, whereas Maharashtra, a leading industrial state with a population of 79 million, allocated Rs. 1087 per person. When one takes into account the efficiency with which this money is utilized between the two states, the disparity is much larger.
- The falling standards in government schools and the slow but steady withdrawal of the government from providing education and health care to those who cannot afford private sector institutions.
- The collapse of the university system in many states due to lack of funding, political interference, corruption, poor teaching, and poorly prepared students.

At this point in time, I am simultaneously hopeful and pessimistic about the future. Hopeful because a very large fraction of Indians believe very deeply that education (in English medium) is the key to upward mobility and are willing to sacrifice and save to educate their children. Pessimistic because over 600 million people are being left further behind and the government is increasingly giving up on providing basic services like education, health care and livelihood to them. The question – how can nations deliver quality education to children of poor illiterate people when they are such a large fraction of the population – is common to most developing countries and needs to be addressed upfront along with the question of models of higher education. The two issues need to be dealt with in parallel.

## GROWTH OF RECOGNISED EDUCATIONAL INSTITUTIONS FROM 1950-51 TO 2001-2002

Years	Primary	Upper Primary	High/Hr. Sec/ Inter /Pre. Jr. Colleges	Colleges for General Education	Colleges for Professional Education (Engg., Tech., Arch., Medical & Education colleges)	Universities/ Deemed Univ../ Instt. of National Importance
1950-51	209671	13596	7416	370	208	27
1955-56	278135	21730	10838	466	218	31
1960-61	330399	49663	17329	967	852	45
1965-66	391064	75798	27614	1536	770	64
1970-71	408378	90621	37051	2285	992	82
1975-76	454270	106571	43054	3667	** 3276	101
1980-81	494503	118555	51573	3421	** 3542	110
1985-86	528872	134846	65837	4067	** 1533	126
1990-91	560935	151456	79796	4862	886	184
1991-92	566744	155926	82576	5058	950	196
1992-93	571248	158498	84608	5334	989	207
1993-94	570455	162804	89226	5639	1125	213
1994-95	586810	168772	94946	6089	1230	219
1995-96	593410	174145	99274	6569	1354	226
1996-97	603646	180293	103241	6759	1770	228
1997-98	619222	185961	107140	7199	2075	229
1998-99*	626737	190166	112438	7494	2113	237
1999-2000*	641695	198004	116820	7782	2124	244
2000-2001*	638738	206269	126047	7929	2223	254
2001-2002*	664041	219626	133492	8737	2409	272

Table 1: There has been an almost linear growth in educational institutions over the last 50 years, however, most of the institutions provide poor quality education.

## THE K-12 SCHOOL SYSTEM

The Indian education system is based upon 12 years of schooling (10+2), which includes primary and secondary education. Secondary schools are affiliated with central or state boards. These boards specify the curriculum and conduct examinations at the end of X<sup>th</sup> and XII<sup>th</sup> grades. Many of the private schools as well as many of the good government schools are affiliated with the Central Board of Secondary Education (CBSE) which is the most prestigious and best managed. The Board has grown from 309 schools in 1962 to 6593 schools in 2001-2002. A number of schools in Africa, Middle-East and South-East Asia are also affiliated with CBSE, and this number too is growing. It is the goal of all private schools to be affiliated with the CBSE. About 300 new schools are affiliated each year. The state education boards are not as successful and their standards are highly varied across the states due to different funding levels and corruption.

The backbone of excellence of India's education system is the private K-12 schools. They provide the foundation with respect to

- Discipline,
- Hard work,
- Ability to self learn,

- Learning to deal with competition,
- Creating a value system,
- Communication and interpersonal skills,
- Respect for self, community, learning, and education.

The good students from the best private schools and some government schools are irreplaceable. Even though most universities are failing to build upon this foundation, these students, if they get any opportunity later in life, excel. The challenge is how to extend this opportunity to all the children and not just to the lucky few percent.

The most telling statistics showing the difference between private and government schools, and between rural and urban schools, is the drop out rate. It is very high in government run rural schools – only about 5 percent of rural children graduate from high school as seen in Figure 1 – and the quality of schools and teaching and economics are major factors. Private schools in urban areas have essentially no drop outs.

Unfortunately, ninety percent of primary schools are run by the government or local bodies (village panchayats, district boards, and community organizations). Most of these are in rural India, and good highly trained teachers do not want to live or work in rural areas. Also in many states that are in financial trouble, like Bihar and Orissa, teachers working in rural schools do not receive salaries on time or fully, so many qualified and willing teachers seek employment in other sectors.

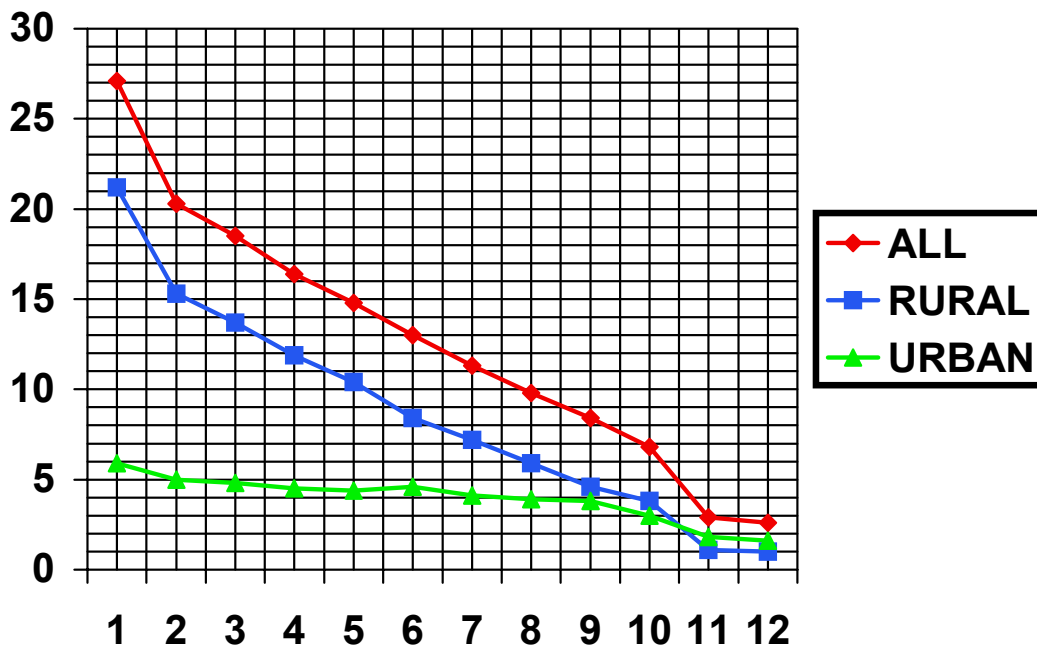


Figure 1. School enrollment in millions of students as a function of the grade (1-12) for the years 1993-1994. The data has been taken from the All India Education Survey 1998, Vol. IV carried out by the Ministry of Human Resource Development.

Private schools are very lucrative. The good news for entrepreneurs is that even individuals can start a primary school with very little investment and make money from day one as the demand is very high and enough people are willing to pay for “English medium” education. The owners can, in fact, save enough money to enlarge the school on a yearly basis. As a result private schools are mushrooming. Unfortunately, the pool of good trained teachers is not growing at a rate sufficient to meet this demand and many students are being cheated – they are paying high tuition fees and getting poor education.

Schools create the foundation and the good news is that they are the least impacted or influenced by the political system. Also, at this level individuals and non-government organizations (NGOs) can have a phenomenal impact. Thus, the first lesson is that without a large number of good schools no nation will be able to create knowledge societies.

### **INDIA’S HIGHER EDUCATION SYSTEM**

India has an extensive higher education system that has grown very significantly (by a factor of ten) since Independence as shown in Figure 2. The key issue is now quality. In 2002 it had

- 196 Universities
- 81 Deemed Universities
- 13 Institutes of National importance (IITs and IIMs)
- 13150 Colleges
- 8.821 million students (including those in distance learning)
- 0.427 million teachers

**Colleges:** Almost all undergraduate teaching leading to B.A., B.Sc., and B. Com. degrees is done in colleges. These courses are of three-year duration and the final official degree is conferred by the university to which it is affiliated and which sets the curriculum. Today, there are about 13,000 colleges and this number continues to grow steadily. The minimum requirement for teaching at a college is a master's degree in the relevant subject and a certain grade (for example having scored more than 55% marks), with Ph.D. trained candidates given preference.

The faculty in colleges is encouraged, not required, to continue research by collaborating with scientists at the university, however, in practice the heavy teaching load (15-20 contact hours per week) and other institutional duties leave little time for this. There are examples of staff that have maintained credible research programs, but they are the exceptions. Most lecturers very quickly loose contact with new developments in their field and settle into a routine teaching schedule — teaching the same material year after year using a standard textbook or their notes from as far back as their own student days — and very often do not cover the prescribed syllabus well. The emphasis is almost entirely on memory — learning by heart the lectures and the probable questions that will be asked in the one and only written examination at the end of the year. Teaching also is increasingly oriented towards covering topics that have a significant probability for being asked in the examination, and many times



only these few topics are taught. Very often a large fraction of the curriculum is left for students to cover on their own if they wish to gain an understanding of the subject and develop the ability to use this material in practical situations.

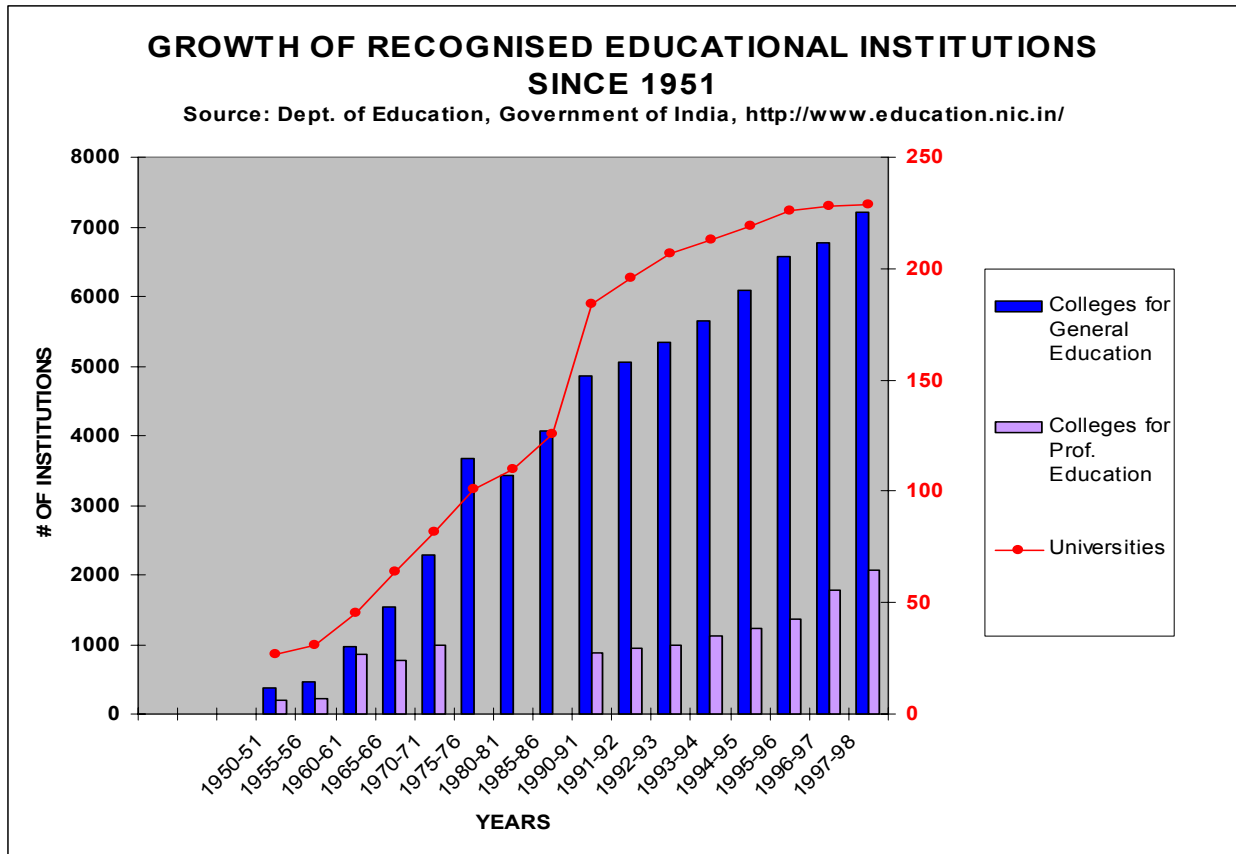


Figure 2: Growth in number of Colleges and Universities.

**Universities:** Overall, the university system is in trouble. To provide higher education to all those who want it, the government increased the size of the student body and the number of universities until the system became unmanageable. To not exclude the poor from higher education, the tuition fees have been kept very low (less than one dollar per month), so the government has to finance the entire operating cost of universities. Since the tuition fee is negligible, many students register but have no motivation to learn. They come to the university to play and are often so disruptive that even the motivated students suffer.

People working in state (central) universities are state (central) government employees. Jobs are permanent from the day of appointment, and promotions are based on seniority and rarely on merit. Thus staff and faculty have little incentive to excel. Political interference, quota systems based on tribe and caste, and corruption have replaced merit as the criteria for hiring and promoting faculty. Nepotism, vested interests, and narrow agendas take precedence over quality, a peer-review system for rewarding merit, and vision. Lastly, the support staff, students, and the faculty belong to highly politicized

unions, who frequently go on extended strikes. The net result is that, today, less than twenty universities could be considered decent or better.

The financial and political situation of many state governments is precarious so a very large fraction of the universities are finding it hard to even pay salaries to their faculty. Many of the science, applied science and technology departments are falling behind because of lack of equipment and good teachers. One very negative consequence of the financial constraints is that in many universities faculty positions are not being refilled when people retire. This is forcing the remaining faculty to initially teach more or bigger classes, and when even this becomes untenable, to hire part time teachers. The question – do the faculty have time to carry out research – becomes moot under these circumstances. Since very little research is being done in these universities and the job has been reduced to teaching ill prepared and unmotivated students, there is no incentive for even the good and motivated teachers to strive towards excellence. The environment is stifling. Many prefer to teach in small private coaching schools that are springing up all over the country as the pay is far better and the students attending these are highly motivated.

Most academics I know have given up hope for the possibility of improvement in these universities. The university system is fast becoming a very poor extension of schools and a producer of unmotivated school and college teachers. Increasingly, it is viewed as a provider of paper degrees – graduation does not reflect competence but only the fact that students were registered in these institutions and met the basic minimum requirements. Students pass examinations held only at the end of each year by memorizing a small set of canned questions that can be guessed by analyzing the pattern of questions asked in the previous five years. If this strategy fails and the results are not to their liking, students, through very powerful unions, demand re-examination or simply annulment of the results and the award of degrees at the end of three years irrespective of whether they have learned anything. Their goal is to be handed a Bachelor's or Master's degree so that they can satisfy basic requirements for a white collar job. I am sure you will see in this description a very depressing situation that, unfortunately, also prevails in the Arab world.

The status of a "deemed" university is granted to functioning institutions by the Ministry of Human Resource development, and enables the institution to participate in programs of the University Grants Commission (the apex funding body of the central government) and seek funding from the state government and the private sector. They have authorization to design their own curriculum, conduct examinations and confer degrees.

**Agriculture Universities:** A large fraction of India's population subsists on agriculture. As a result there are 27 agricultural universities, and a large number of research centers and institutes. India is self-sufficient in food grains and a leading producer of several commodities in the world. It boasts of the green revolution in crops, yellow revolution in oilseeds, white revolution in milk production, blue revolution in fish production and a golden revolution in horticulture. At the same time over 40% of its population is malnourished due to poverty and poor distribution systems, about 36% lives below the poverty line and there are few safety nets for the poor. Also, the application of research

carried out by these universities is very uneven. States like Punjab are quick adopters (see <http://www.pau.edu/Website/researchmajrimp.htm>), whereas poor states like Bihar, Orissa, and Rajasthan are lagging as most of the small farmers there are illiterate and don't have the capital to invest in modern farming tools.

India has many fertile river plains, over 50% of its land is arable and the weather is favorable, so agriculture should have been a niche economy given the number agricultural institutions and the quality of research in them. India does earn a substantial amount of foreign exchange from agricultural (food and fiber) products and jobs in the agricultural sector will continue to provide livelihood to a large fraction of the population in the coming decades. However, with increasing population, water shortages, pollution and soil degradation it is not clear that the food sector will continue to be a major foreign exchange earner. In fact there is growing consensus that India needs a second green revolution, a good distribution system, and well designed safety nets for the poor and marginalized populations in order to provide adequate food to all and overcome malnourishment.

The institutions of higher education that have caught the world's attention are actually very few given the size of India, its population, and the number of universities and colleges. The best are, not surprisingly, the institutes of national importance. The most notable are:

**The seven Indian Institutes of Technology (IITs)** located in Chennai, Delhi, Guwahati, Kanpur, Kharagpur, Mumbai, and Roorkee. The IITs are funded by the central government and have been relatively free of political interference. They are administered centrally by the IIT Council, an apex body established by the Government of India to coordinate activities of these institutes. Each IIT has a Board of Governors responsible for its overall administration and control.

Much has been said and written about the IITs, so my comments will come as a surprise to many. The IITs, while much better than most other educational institutions in India, are mediocre compared to M.I.T. (on which they were patterned), Caltech, and the leading universities in the US. In most departments, one finds inbreeding and politics playing a large role in the hiring and promotion of faculty so the quality of teachers is uneven. Since there is very little R&D in Indian industry and the Indian defense establishment does not partner with academia, there is very little intellectual and financial support for research in the basic and applied sciences and consequently very little genuine research is being carried out even in these institutes. Even teaching is often uninspiring. Overall, it is the chemical, electrical and mechanical engineering departments that are faring better with respect to both teaching and partnering with industry.

The reputation of the IITs is largely built on the quality of the students it admits and, therefore, graduates. IITs admit about 3000 students, from over 100,000 applicants out of the roughly 25 million children born each year, based on a very tough nationwide entrance examination. These students learn as much from each other (horizontal learning)

while working through the text books assigned as part of the curriculum as from their teachers. Most of these students, between 60-80 percent, migrate to the West and only there do they really blossom. Later in the talk I will provide reasons for why, within the Indian context, the IITs are, nevertheless, considered outstanding.

**Regional Engineering Colleges:** There are about twenty such colleges, of which about 8-10 have maintained decent standards and produce another 4000 well qualified engineers annually.

**Indian Institutes of Management (IIMs).** There are six such institutes (at Ahmedabad, Bangalore, Calcutta, Indore, Kozhikode, and Lucknow) that provide post-graduate education in different aspects of management and business. They admit about 1500 students every year and have affiliations with some of the most prestigious management schools in the USA. Most of their graduates get choice employment opportunities with the large Indian corporations or multinationals.

**Medical colleges:** The top 50 of the 187 medical colleges admit about 5000 students every year and are still able to produce world class doctors. The remaining medical colleges admit another 14,000 students and the quality of their training is very uneven and often poor. (For details of colleges and enrollment see the Medical Council of India web site at [http://www.mciindia.org/apps/search/show\\_colleges.asp](http://www.mciindia.org/apps/search/show_colleges.asp).) Most of the good medical colleges are private and are attached to private hospitals. They have their own admissions criteria. Unfortunately, standards in even these are falling for two main reasons that are ultimately related to funding. First, most of these colleges cannot keep up with new discoveries and cannot afford to acquire the state-of-the-art facilities as diagnostic and surgical procedures evolve from experience guided by simple laboratory tests to highly complicated and expensive machine based ones. The second is the glaring disparity in the salary of teaching doctors, who are often prohibited from having a private practice, and practicing doctors. It is common to see factors of ten, but even factors of fifty are not uncommon. Thus, there is increasingly little incentive for good doctors to teach. Many of the well trained doctors, till very recently, migrated. Today, they are absorbed by elite medical centers that provide specialty care at international standards. The less well trained students, after graduation, are absorbed in government hospitals and health centers or open small private clinics.

**Research Institutes.** There are a number of research institutes in various disciplines of science, engineering, technology, and social sciences scattered all over India. Two prominent examples are the Tata Institute of Fundamental Research in Mumbai and the Indian Institute of Science, Bangalore. These institutes are much better funded than the universities and many of them are recognized internationally as centers of excellence. The faculty is primarily involved in research and maintains close links and collaborations with colleagues in the West. These institutes have almost no contact with undergraduate students and many have no students at all. Thus, the best scientists do not inspire, nor do they train, the coming generations directly. Some of these institutes have Master's and Ph.D. programs. The total number of students in all research institutes combined, hand picked for post graduate studies, is only a few thousand annually!

## **The education system is a ruthless selection funnel**

As I have described above, only about 15000 students get admissions into decent technical, engineering, science, and medical colleges combined. Assuming that at least 5 percent of the high school graduates (which number about 3 million per year) could have been star performers, I shudder to ask what happens to the remaining roughly 185,000 highly talented students that do not make it to these prestigious institutions. I believe it is important to illustrate how this attrition takes place.

The Indian education system is an unforgiving selection machine. Of the roughly 25 million children born in a given year, at least 10 million never make it to even primary schools in any significant way. Of the remaining 15 million another 7.5 million drop out by the eighth grade, i.e., only about 30 percent of children go beyond eighth grade. (In this context it remains to be seen how the 2002 law directing all states to provide free and compulsory education to all children between the ages 6-14 will affect these rates.) Of the remaining 7.5 million students only about 3 million graduate high school (class XII). The quality and preparation of these graduates is very uneven. The good private schools (about 1000 throughout India) produce enough qualified students (about 200,000) to saturate all the seats in all good universities, and engineering, medical and technical institutions. Thus, only the very exceptional students from government schools and from poor rural backgrounds, *i.e.*, those who are highly motivated and became self-learners at a very early age, stand a chance of succeeding in the competitive examinations for admission to good institutions of higher learning.

Students get locked into arts, science, commerce, or medicine streams after the first set of board examinations in the X<sup>th</sup> grade (sometimes even before). While there is some flexibility of movement within these fields (engineering versus basic science), there is almost none between them. Once in college, a student choosing biology (in the hope of becoming a doctor) cannot take mathematics as a co-major.

The transition from high school to college is devastating for many to say the least. Even though about 70 percent of the high school graduates get admission to some college, the majority of students talented enough to succeed in the top ten universities in the US do not get admission into any decent technical school. The best that a talented high school graduate, who does not make it into a prestigious institution, can do is to get admission in a local college and hope that she/he learns enough skills to get a decent job. In most cases their talents are never utilized, and even after a Master's degree most end up as shop attendants or office help. So parents work very hard from the time of a child's birth to maximize chances of getting her/him into one of the good colleges. Unfortunately this means that more and more parents are competing to get their children admission into a good private school and trying to gain further advantage for them through additional coaching classes, often starting in Kindergarten. Even amongst students who can afford these privileges and survive such a rigorous schedule through twelve years of school, the majority do not succeed in getting admission into a good college.

Fortunately, globalization has provided a solution for the well-to-do. Current estimates are that every year about 25 thousand students leave India for college education abroad. The pressure and incentive to migrate starts in high school when parents and children realize that chances for admission into a decent college are very small. The tragedy behind this “solution” is that since the well-to-do can send their children abroad, they have not pushed the government for reforms and improvement of the university system. Even the statistics of those that remain, dismal as they are, are misleading as the quality of education is very varied and poor in most universities. Many graduates do not acquire skills to function in a knowledge society even after having spent large sums of money and time. The cynical view is that since there are not enough good jobs to absorb even those that are being well educated, it is premature to worry about those that are not being well trained. In summary, the overall picture of the educational system is not very positive and India’s successes and failures provide valuable lessons for all developing countries.

### **LESSONS FROM INDIA: NICHE OF EXCELLENCE**

To draw lessons from India, I would like to summarize where India stands today – in particular what are its niches in the technology driven knowledge society? India has, without doubt, made tremendous progress since independence. In addition to a factor of three increase in food production, India has developed many niches of excellence and an enabling infrastructure for the top third of the population. These niches include

- Software. Proficiency in the English language, an aptitude for mathematics, and a large underemployed but skilled labor pool are major factors in the quick growth in the service part of the IT revolution. Today IT is a roughly **\$10B** industry and growing very rapidly. India has almost no presence in the hardware (component) or system software (infrastructure) parts of computer and information technology.
- The pharmaceutical industry. There are about 24,000 companies – small, medium, big – fighting for a USD 3.9 Billion export market in generic drugs. The Indian pharmaceutical market is ranked 12<sup>th</sup> worldwide. About 300 firms are in the organized sector, about 15,000 are in the small scale sector, and the rest are very small and without any economy of scale. India manufactures over 400 bulk drugs and around 60,000 formulations, which are distributed by over 500,000 pharmacists all over the country.
- Polishing and cutting of precious and semi-precious gem stones. Until 2002 this industry was the largest foreign exchange earner for India and in 2002 its total annual market output was \$7B. It grew by exploiting a very large indigenous market for jewelry, and a cheap labor force often consisting of adolescent children. The diamond merchants started by cutting and polishing small stones that would otherwise have been used for industrial purposes. Today the mainstay of the industry includes cutting and polishing middle size and quality stones. It is unlikely that this industry will grow significantly beyond \$10B in the next decade.
- A very large manufacturing base that produces everything from nails and screws, to garments to machinery to cars to fighter planes. The quality, while improving, has, in most cases, not been good enough to compete in the global market, nevertheless it serves the needs of the common person. Today, a significant

fraction of this industry is under threat from competition from China, the Asian Tigers and the West. It remains to be seen whether the more forward looking of the entrepreneurs and industrialists will develop a national culture of quality, reliability, design and innovation.

- An emerging niche in specialized medical care.
- An infrastructure to deliver running water, sanitation and electricity to towns and cities. Even though the current services cover only about 30-40 percent of the population and serve mostly the well-to-do, it is national in scope.
- A large infrastructure for education and health care, which also serves mostly the well-to-do.
- An extensive network of hydro and thermal power plants; coal, iron, and steel plants; fertilizer, pesticide and chemical industry.

In short, India has enough food, infrastructure for industry, industry, education and health care facilities that had its population stabilized at about 400 million, it would have been a leading developed country. With over a billion people it is tottering. The future of the 600 plus million at the bottom is bleak and the question is whether they will destabilize the country or somehow continue accepting their marginal existence as subsistence farmers or menial workers. There is a lesson in this for the Arab world. If it can stabilize its population at even today's population of about 300 million, it has the resources to develop as a whole. If the current trends of population growth and poor governance persist, then the future of the weaker members is bleak.

## **WHAT HELPED CREATE THE NICHE OF EXCELLENCE**

The commonly held image, in the mind of Westerners, of the engine for development of India is its software industry. The emergence of this industry was certainly not planned and even today many politicians and intellectuals are critical of the circumstances that led to this serendipitous situation. How and why did this come about?

### **Indian Institutes of Technology**

Right from their creation during the period 1951-1963, the original five IITs have been selecting the most talented students and training them in science, applied science and engineering. The majority of the graduates have migrated to the West. Until about the 1990s many of those remaining in India got degrees in management right after their engineering degrees. Indian industry, lacking R&D, was not ready to use their technical talents, which was one of the major reasons why so many migrated. In spite of this lack of benefit to India, the IITs managed to continue functioning and producing top students in pretty much the same mold as at the time of their establishment.

The IITs set a standard of excellence that inspired and motivated the scientifically gifted children. They created a point of focus for all parents who believed that technical education is the key to success. Parents wanted their children to aspire towards a degree

from an IIT. Without a sufficient number of such excellent institutions to inspire the public, I fear India would have become closed, myopic, and regressive.

The curriculum continues to be rigorous, though uninspired. Most students continue their lifestyle of discipline and very hard work, focus, and drive acquired during their school days and in preparation for the IIT entrance examination. The curriculum includes regular assignments and evaluation. The examination system remains untarnished.

The IITs have withstood pressure from the politicians and the public to admit more students every year. They still admit roughly 500 students per institute per year. With small class sizes and a total strength of about 3000 students, each institute has considerable flexibility in improving course material and incorporating new courses.

The entrance examination to the IITs, and its grading, continues to be fair.

The students of IITs are much less politicized and campus life is not dominated by powerful unions.

The IITs started as isolated self-contained colonies and have managed to preserve this facility. The faculty and students reside on campus and are, to a very large extent, sheltered from the day to day trials faced by the common person. Since basic amenities like housing, water, electricity, sanitation, routine health care, K-12 education for their children are all part of the package for the faculty, they are able to keep their sanity and some degree of ethical standards, whereas the rest of the population confronts high levels of corruption daily.

Many of the alumni of the IITs are now very prominent technocrats, industrialists, scientists, and bureaucrats. They are a sufficiently powerful voice and lobby that will probably succeed in preventing political interference from undermining the IIT system.

## **Medical Centers**

Another emerging niche in India is specialized medical care. Even if only 200 million people in India can afford specialized care, this is a very large market. Up to the mid-nineties, the well-to-do would go to the West (UK or USA) for specialized care. As more and more Indian doctors working in prestigious medical centers in the UK and the USA gained international recognition, stellar reputations, and a steady clientele of Indians, many started shuttling back and forth between their regular job and India. A new standard was created by Cardiologist Dr. Naresh Trehan who migrated back to India in 1988 and started the Escorts Heart Institute and Research Center in New Delhi. This is now a world famous center, a world leader in cardiac care and a pioneer in developing a system for attracting many foreigners to India for treatment.

Today, there is a proliferation of specialized medical care centers. These centers provide world class care, maintain international standards and charge between 10-25% of what similar centers in the US charge. As a result, these centers have now become the



preferred destination for the upper tier in India, the middle to upper middle tier in Middle-East and South East Asia.

The doctors working in these centers earn international salaries and most complain that they don't have the time to spend the millions they earn. An even more important "quality of life" factor is their status in society – they are revered. The net result is many of the best doctors are now choosing to live and practice in India.

The emergence of these centers is providing job opportunities for the best of the well-trained doctors. Unfortunately, standards in hospitals are much lower. It remains to be seen whether medical colleges, teaching hospitals, and hospitals in general can improve and function under similar standards, especially since over 70 percent of the population is rural and over 90 percent cannot afford to pay anywhere near international rates.

### **Indian Pharmaceutical Industry**

The growth of the pharmaceutical industry capitalized on the large chemical and petrochemical industry (which in no small measure was influenced by the agriculture sector, i.e., the huge need for fertilizers, pesticides, plant growth regulators, and fungicides) and a very large system of indigenous medicine — Ayurvedic remedies based on naturally occurring herbs and chemicals.

The India Patents Act of 1970 also played a pivotal role in the development of the Indian pharmaceutical industry. It explicitly disallows product patents for "substances intended for use, or capable of being used, as food or as medicine or drug." Only the process could be patented. Thus Indian companies were freed to produce and sell drugs manufactured using a different process. Even today, the industry is mostly characterized by reverse engineering with very little indigenous R&D for product development. With the new TRIPS agreement, India has to conform to the international patent laws starting in 2005, and the industry is scrambling to adjust. A recent summary of the weaknesses and strengths of the industry and where it is headed was presented by Professor S.K. Kulkarni at 35th Indian Pharmacological Society annual meeting, Gwalior, 26-29 Nov. 2002. It is available at <http://www.indianpharma.org/pt/index.php/2003/1January/challenge.htm>.

It is important to note that in spite of the huge publicity that the Indian pharmaceutical industry has received in recent WTO negotiations, its total annual output is only about **\$6.5B**, of which exports amount to about **\$3.5B**. This number should be compared to sales worth **\$8B** for just one cholesterol lowering drug Lipitor by Pfizer. Even though Indian pharmaceuticals have such a small share of the global market, the international pharmaceutical giants and the Western governments are already up in arms. TRIPS will squash the ability of developing countries to reverse engineer life saving drugs and be major players in the generic drugs market.

It is clear from the above examples that governments play a pivotal role in facilitating the creation of institutions of excellence and of niches in the global economy. It is therefore important for me to give a very brief overview of where India stands on this count.

## **INDIA IN TRANSITION**

Today India's political system and economy is in transition. Its government is evolving from essentially a one party democracy to factious multiparty coalitions. Its economy is moving from closed and sheltered to open and competitive. The bureaucracy is being challenged. The British colonial rule and independent India for the first forty year period, when the economy was mostly agriculture based, created and maintained the notion of the senior bureaucrat as "king". Today the private sector salaries, even those of starting IT engineers, are many times those of senior bureaucrats and power is much more shared between the government and the private sector. In spite of these changes, the common bureaucrat has yet to make the attitude adjustment from being a "king" to being a public servant.

Politicians routinely undermine the work and planning of bureaucrats and treat them as their personal assistants. Rather than confront this interference, many bureaucrats have joined with the politicians to make enormous fortunes through corrupt practices. With politicians, bureaucrats, and industrialists controlling almost all the resources and having the power to subvert law and order to suit their wishes, corruption has become a way of life. This nexus has created an alternate system based on "whom you know" rather than a respect for merit and competence. This system "functions" for the top 200-250 million people, and in it the rest are viewed as a convenience (during elections or as laborers) or a headache (preventing development and crowding the streets).

Many state governments have given up maintaining even a pretense of providing basic services and are functioning as kleptocracies. This is a very unstable situation. A large illiterate population in a "knowledge society" is an increasing drag on development. On the other hand politicians recognize that providing even good high school education to the majority of the population without simultaneously creating meaningful jobs will lead to an enlightened public that will challenge the convenient nexus between politicians, bureaucrats, and industrialists. Unless major changes are put into place, it is very difficult to imagine any public institution, not just universities, functioning well. Only privately managed K-12 schools, "small" colleges, research institutes, and specialty medical centers can be well managed as these institutions are small, self-sufficient, and require only a few enlightened individuals to lead and have a very significant impact.

## **OVERALL LESSONS:**

The Arab world is not alone in facing many extreme challenges to making the transition to a developed region. The Arab world is unique in that it has oil that is essential to world economy and the reserves are large enough to finance the creation of the infrastructure necessary for the development of all 300 million Arabs. I have summarized some of the key indicators of development in the Arab world in Table 2. The oil producing states are shown in red. From these data it is clear that development and standards of living are very uneven, and even the oil rich countries are not starting from a position of strength (in particular note the number of non-nationals in their labor force). Almost all Arab nations have a third or more of their population under the age of fifteen, and this

population bulge will be demanding jobs over the next decade. There are few world class universities within the Arab world to train them. If the Arab nations do not move quickly to provide quality secular education to all and meaningful jobs, their populations will continue to grow disenfranchised and in a couple of decades even oil wealth will not be sufficient to overcome the many internal challenges. India, while rich in land, soil and water and thus able to sustain a large population on agriculture, nevertheless illustrates very clearly the mounting challenges posed by a large population, especially illiterate or semi-educated, in a knowledge society. So there is urgency in the need for major long-term investment in education, health care, and job creation.

The lessons from Indian institutions of higher learning is that developing countries can have excellence (perhaps not inspired excellence) if institutions are created and maintained as islands – pretty much isolated and insulated from the rest of the population. Today it is much harder to create islands and those in India (like the IITs and IIMs) are being engulfed geographically and socially. Their ability to maintain autonomy is constantly being challenged in spite of their unquestionable track record of success in producing exceptional leaders and scholars who are major contributors to India and to the world. What allowed these institutions of excellence to survive the first forty years?

The concept of creating islands of excellence was the brain child of Pundit Jawaharlal Nehru, India's first prime minister. He personally willed many of them into existence. After his death in 1964, his political party, the Congress, and in fact his progeny, governed India until 1996 except for few short interruptions. Thus his legacy was preserved as a matter of party and family pride. Today, this protection is no more and it now hinges to a large extent on the alumni of these institutions, a very powerful lobby in the halls of policy makers and in the national economy, to ensure that these institutions can maintain autonomy and avoid political interference.

What is clear from India's example is that if you want centers of excellence then you have to allow them to focus on providing excellent education as a goal in itself, encourage the faculty to develop a serious research effort, and provide adequate and stable funding for teaching and research without asking for payback and profit in the short term.

All Indian institutions of higher learning have maintained English as the language of instruction in the physical sciences, engineering, technology, and medicine. The Indian intelligentsia and entrepreneurs, as a result, have no barriers to overcome when integrating into global systems, learning from them and contributing to them. There is little doubt that English is now the global language of commerce and international agreements. Instead of regarding English language skills as a boon, many Indians accuse the English medium education system of producing elites that do not serve the public and are contributing to an erosion of Indian culture. They cite the use of English language as a major factor in creating a schism between urban and rural India. Irrespective of whether there is any merit in their argument or whether this criticism ignores the fact that society, not educational institutions, has a bigger hand in creating insensitive elites, I believe it would be disastrous to even contemplate teaching science, engineering, and

	Population 1950 (millions)	Population 2002 (millions)	Population 0-14 (millions)	Population Growth Rate	Fertility Rate (children born/woman)	Infant Mortality Rate (deaths/1,000 live births)	Labor Force (thousands)	Non-Nationals (thousands)	Literacy rates	GDP (ppp) (billions)	GDP (ppp)/capita
<b>Algeria</b>	8.89	32.28	10.82	1.7%	2.6	39.2	9,400		61.6%	177	5,600
<b>Bahrain</b>	0.115	0.66	0.19	1.7%	2.8	19.2	295	230	88.5%	8.4	13,000
<b>Comoros</b>	0.148	0.61	0.26	3.0%	5.3	81.8	145		57.3%	0.424	710
<b>Djibouti</b>	0.06	0.47	0.20	2.6%	5.6	99.7	282		46.2%	0.586	1,400
<b>Egypt</b>	21.2	70.71	24.01	1.7%	3.0	58.6	20,600		51.4%	258	3,700
<b>Iraq</b>	5.16	24.00	9.85	2.8%	4.6	57.6	4,400		58.0%	59	2,500
<b>Jordan</b>	0.561	5.31	1.94	2.9%	3.2	19.6	1,260		86.6%	21.6	4,200
<b>Kuwait</b>	0.145	2.11	0.60	3.3%	3.1	10.9	1,300	1,160	78.6%	30.9	15,100
<b>Lebanon</b>	1.36	3.68	1.00	1.4%	2.0	27.4	1,500		86.4%	18.8	5,200
<b>Libya</b>	0.96	5.37	1.88	2.4%	3.6	27.9	1,500	660	76.2%	40	7,600
<b>Mauritania</b>	1.01	2.83	1.34	2.9%	6.2	75.3	786		41.2%	5	1,800
<b>Morocco</b>	9.34	31.17	10.53	1.7%	3.0	46.5	11,000		43.7%	112	3,700
<b>Oman</b>	0.489	2.72	1.14	3.4%	6.0	21.8	920	530	80.0%	21.5	8,200
<b>Palestine</b>		3.20		4.8%		25.3	635				
<b>Qatar</b>	0.025	0.79	0.20	3.0%	3.1	20.7	280		79.0%	16.3	21,200
<b>Saudi Arabia</b>	3.86	23.51	9.97	3.3%	6.2	49.6	7,000	4,000	78.0%	241	10,600
<b>Somalia</b>	2.44	7.75	3.47	3.5%	7.1	122.2	3,700		37.8%	4.1	550
<b>Sudan</b>	8.05	37.09	16.41	2.7%	5.2	67.1	11,000		46.1%	49.3	1,360
<b>Syria</b>	3.49	17.16	6.73	2.5%	3.8	32.7	4,700		70.8%	54.2	3,200
<b>Tunisia</b>	3.52	9.82	2.73	1.1%	1.9	28.0	2,690		66.7%	64.5	6,600
<b>UAE</b>	0.072	2.45	0.68	1.6%	3.2	16.1	1,600	1,580	79.2%	51	21,100
<b>Yemen</b>	4.46	18.70	8.79	3.4%	6.9	66.8	NA		38.0%	14.8	820
<b>India</b>	370	1,043	342.58	1.51%	3.0	61.5	406,000		65.0%	2,500	2,500

*Table 2: A 2003 summary of some of the key indicators of development in the 22 countries of the Arab world. The oil producing countries are shown in red. I have included data on India for comparison. The variation in development indicators between the Arab nations is about as large as between the different states in India.*

medicine in the vernacular. Global connectivity is essential in institutions of higher learning and research and because all good journals and books are published in English. The amount of information being generated is too large, and the pace of discovery too fast, for even automated translating systems to be a viable solution in the near term. The non-English speaking world has lost this battle and one should not waste precious time in wishful thinking and trying to turn back the clock.

Indian institutions of excellence continued to churn out very talented students for decades even though the majority of them migrated. Other good institutions graduated even larger numbers of qualified and competent people with a background in science, engineering, mathematics, or in medicine. The success of many of them in the West created a large enough pool of self-confident entrepreneurs who came to believe in their abilities and in other Indians as having the potential to compete with the best. They also accumulated capital and since the mid 1990s have invested it to make things happen both in the US and in India. They capitalized on the large, talented but underutilized pool of engineers and techno-savvy graduates living in India to help make India a powerhouse in the service sector of IT. This migration and subsequent payback has been a major locomotive for development for many countries in transition and earlier for the Asian Tigers.

To attract talent back from the West, today India does offer a better quality of life for many. Those earning what they can get in the international market have a very comfortable life style that includes domestic help for all daily chores. They can buy all luxury items that the global economy has to offer and rub shoulders on equal terms with the best. They can indulge their desire for social relationships that they grew up with – an extended circle of family and friends. In this context I am beginning to see three positive trends – some of those who migrated are returning, some are shuttling back and forth and are comfortable maintaining a presence in both the West and in India, and others are choosing to not migrate.

One cannot create niches of excellence by focusing only on the domestic market. Those who can afford to pay for high tech goods will buy what they perceive to be best in the world and will not settle for something just because it is made in their country. Those who want to do research will want to be in an environment that promotes and nurtures creativity. This is true in India and more so in the Arab world which has been far more exposed to the West and to Western goods. My belief is that solutions that keep the Arab world isolated, until it can interact on equal terms with the outside world, will not succeed in general.

There are many hurdles to overcome if one wishes to implement the lessons that can be learned from India – Indian government funded elitist educational institutes whose graduates mostly migrated for well over forty years before it got payback in the form of niches of comparative advantage in software and service sector of IT, manufacturing, medical care, and in generic pharmaceutical drugs. This is a hard lesson to sell to politicians with narrow focus and short attention spans. Also, many intellectuals and nationalists are uncomfortable with the elitism shown by the graduates of these institutes. They want these institutions to have social relevance and not function as ivory towers. I

believe that without such institutions there will be no excellence. Social relevance should be left to individuals to implement after they have been properly trained and requiring it as policy will prove harmful. In this context it is worth mentioning that during the period 1955-75 Taiwan and South Korea went through their development phase seeing many of their best migrate. The difference is they saw payback after about twenty years.

Having summarized the positive aspects and trends I will end with why I, nevertheless, feel pessimistic about the future for India as a whole unless major structural changes occur soon. I believe that this discussion also has very valuable lessons for the Arab world.

The future of about 600 million Indians, living mostly in villages, is bleak. A large fraction of the population without modern skills cannot be left to face globalization and market forces on their own if governments want long term stability. At current rates of development, it will take at least a few generations before any significant number of them can become part of the knowledge society. Creating and nurturing just institutions of excellence will not help this group make the transition in the short term. Helping them requires a similar dedication to excellence starting at the level of primary schools. To implement this requires that the system, both political and social, have enough resilience to maintain focus and commit resources to simultaneously empower the talented and help the many poor and illiterate develop. The latter will take many decades. Governments of all developing countries have to make this long term commitment, create the safety nets to protect communities, agricultural and pastoral, that need substantial time to learn new skills necessary to integrate into the knowledge society.

What is in evidence in India is that the government is giving up on providing quality K-12 education and health care for the general public, especially for the poor. They are hoping the private sector will come in and deliver education and health care. It is true that within the circle of the well-to-do both of these activities are big money earners and there is an acute shortage. So the private sector is jumping in to fill the void, but it is, in general, not interested in helping those who cannot pay. Many of the 600 million Indians at the bottom of the socio-economic ladder grew up in extreme poverty, did not attend school, were highly undernourished throughout childhood, and therefore cannot compete, without help, with the well-to-do in a market driven economy. If the government is becoming more and more dysfunctional and reneging on its promises to the common man, hope lies in action on the part of individuals and in establishing public-private partnerships. Providing both K-12 education and health care are within the purview of individuals to impact. Private sector, NGOs, voluntary and charitable organizations will have to step in to help these 600 million people. At the same time, with increasing awareness and knowledge, the marginalized can learn to assert their right as citizens of a modern society and make providing basic services to all the highest priority of the government.

Even though many Indians today see a better quality of life for themselves in India, this is not true when it comes to their children. They are no longer confident of the choice they made to stay in India when faced with planning a future for their children – when they

have to deal with the small probability of their child gaining admission to the IITs or one of the other good colleges. They start to think seriously when they have to teach children how to survive in a very corrupt environment. Their stress levels are reaching Western standards as they confront living in overcrowded, poorly planned, and polluted cities. To my mind the ultimate comment on the Indian situation is the fact that the adult children of almost all academicians working in decent or good universities and institutes, and of upper echelon bureaucrats, have migrated abroad. The government has to invest heavily in infrastructure development, providing entrepreneurs incentives to locate in India, and transparency and accountability in its operations in order to accelerate retention of the talented.

## **CONCLUSIONS**

The touted successes of India's higher education system and the emergence of niches of excellence are built upon a foundation of excellent K-12 private schools. Of these students, those who gain admission into one of the exceptional institutions, within India or abroad, excel. The lesson from this is that education institutions at all levels – primary schools, high schools, colleges, universities, and research institutes – and in sufficient numbers – have to all work well to create a knowledge society.

Lessons from India show that when merit in teaching and research is superceded by other narrow interests, standards in universities fall quickly and even a minimum curriculum is not taught well. The country is then not able to capitalize on the talented pool of high school graduates. The alternative to universities – proliferation of independent colleges and training schools – is unregulated and unmonitored. Most of them charge high fees but do not have enough trained teachers to offer a well rounded curriculum. So a very large fraction of the population that has the talent for higher education does not receive it and ends up with poor job opportunities.

When I first read the Arab development report I was disappointed because it only talked about the problems and what should happen. There is little discussion of how to get there and what steps an individual could take to help. Today, after listening to other speakers I have a better understanding of why the authors left out providing solutions. There is no one guaranteed solution and the model that works is unpalatable to many as it is associated with the West. Unfortunately, the time-tried solution will have to be rediscovered and given an indigenous face so that it can be applied without baggage. In all cultures and throughout history, educational institutions have been islands, very often isolated and insulated from the surrounding social reality. Indian history and philosophy is unequivocal in how to create tomorrow's leaders. Send them to live in isolation with a sage for years of study. Let them first learn to learn, and to see and experience the natural world around them. Society sought to create the next generation of leaders with open minds and without saddling them with the burdens and failures of the current. Once students acquire tools, they can then come back to society and deal with real issues. Throughout history, the goal has been to create self-learners and let them find solutions to today's and tomorrow's problems. The Arab world (madrassas), China, Europe (seminaries and monasteries), and in fact all major civilizations, have this tradition. This

is not a Western solution but a common heritage even though the West currently has the best working examples. So let us not waste time looking for new models, especially when the window of opportunity is short.

Some aspects of the model have changed and some are still the same. Today institutions of higher learning work provided they are

- well funded,
- manageable in size (not exceeding 10,000 students),
- valued for both teaching and research,
- not pressured into admitting students who do not want to learn,
- allowed to remain secular and maintain intellectual and academic freedom,
- equally enriching and empowering for men and women alike,
- insulated from political interference,
- allowed to use peer review to monitor the system, and
- allowed to hire and retain faculty based on merit in both scholarship and teaching.

Finally, due to the size and complexity of running modern institutions, a professional and transparent organizational and management structure is required. Our efforts should be in creating this environment and in generating the political and social will to value it.

In the end creating institutions of excellence comes down to nurturing, rewarding and keeping the talented. To counter migration of talent, home countries have to provide an enabling environment, good governance, and resources and opportunities for growth. The quality of life has to be better at home than abroad. This typically includes educational opportunities for children, health care, housing, good and fair implementation of laws, lack of corruption, access to basic services like electricity and water, social networks and domestic help. In addition,

- for doctors to stay there have to be good hospitals with state of the art facilities, and a population capable of paying at international levels;
- for good teachers and researchers in science and technology to stay, society and the education system has to value research and teaching. Industry should partner with academia for R&D, partly sponsor the research, have the capability for transforming ideas into products, and the capacity to absorb good students;
- for good technical graduates to stay, the industry has to be forward looking, reward those who want to create new products, and not rely on just reverse engineering or maintaining systems created by others;
- for entrepreneurs to stay they must have access to capital under reasonable terms; the government must provide basic infrastructure needs like electricity, water, transport and land; there should be political and economic stability, and government regulations and controls should be fair, transparent and uniformly implemented.

In the final count India, or the Arab world, or any country for that matter, will thrive only if the majority, and not just the top twenty percent, has the opportunity to make the transition to a knowledge society. A democratic nation with universal suffrage in which



twenty percent or less of the population lives in luxury and controls almost all the resources and the rest face severe impediments to making the transition is not stable. Delivery of education and health care are keys to this transition. The good news is that individuals can make a phenomenal difference in providing education and health care. If each of us who cares changes the lives of five marginalized people, we will succeed.

Institutions of higher education cannot survive as profit making organizations based solely on student tuitions. The government has to fund them to teach and carry out research. The public has to value them and invest in them through donations. It will take decades to build a good education system that will serve the general population, create centers of excellence and niches in the global knowledge economy. It is therefore very important to start valuing and investing heavily in secular education today.

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