



# Introduction to Innovation Policy for Developing Countries

## Module 03: Case Study

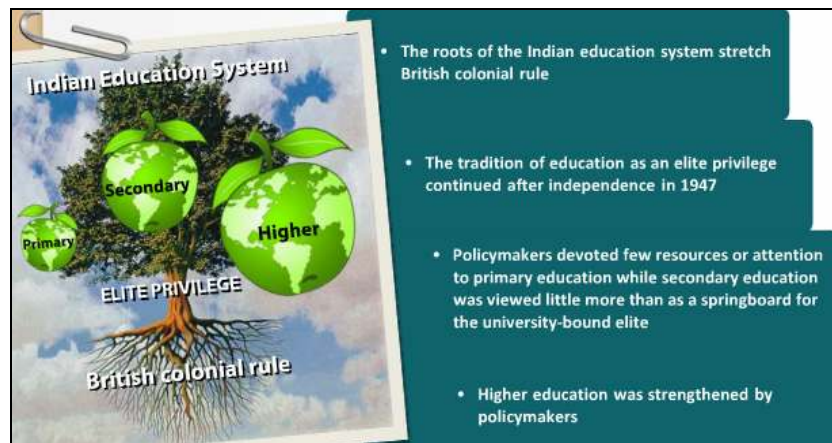
### India and Korea - Tale of Two Education Systems



### India's Education System: History Background

The roots of the Indian education system stretch British colonial rule, where missionaries established centers of learning dedicated to teaching elites English and basic western scientific thought. The tradition of education as an elite privilege continued after independence in 1947. Policymakers devoted few resources or attention to primary education while secondary education was viewed little more than as a springboard for the university-bound elite.

From the outset, higher education was strengthened by policymakers. Since independence, the number of Indian universities has exploded by a factor of 13, the number of colleges by a factor of 24, and enrolment by more than a factor of 10, though gross enrolment rates remain relatively low.

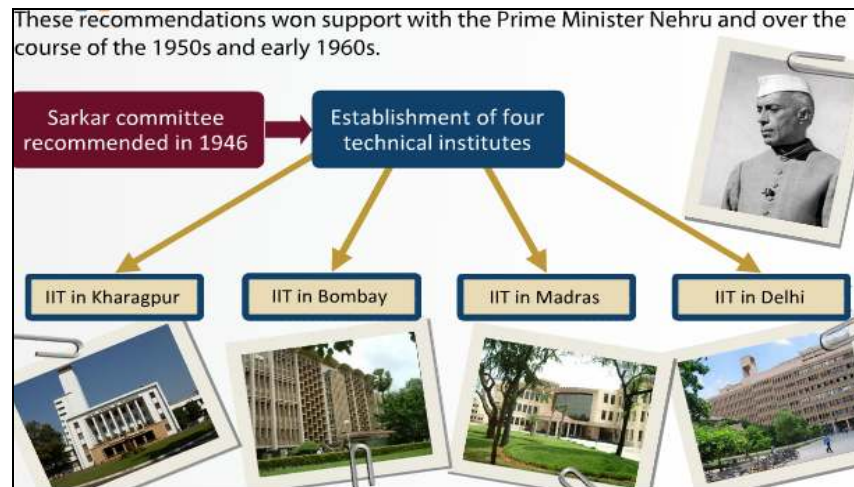


### India's Education System: Institutions of Excellence

The jewels in the educational crown are the Indian Institutes of Technology (IITs), Management (IIMs), and Science (IISs). They trace their roots to the work of the Sarkar Committee which recommended in 1946 the establishment of four technical institutes that would be a step change from bread-and-butter engineering colleges. These recommendations won support with the Prime Minister Nehru and over the course of the 1950s and early 1960s, institutes were established in Kharagpur (since renamed as Kolkata), in Bombay (since renamed as Mumbai), in Madras (since renamed as Chennai) and finally in Delhi. In the 1990s, following student pressure, two further institutes were added to the IIT system.



These institutions have allowed Indian skilled workers to make their mark, domestically and globally, in engineering, pharmaceuticals, IT and R&D. These achievements, in turn, have had positive spillovers for other sectors as well by building confidence in Indian industry, enhancing the country's brand equity in the world, and in offering entrepreneurial opportunities on a global scale.



### India's Education System: Success Factors

The success of the IIT system can be attributed to a number of factors: as institutions of national importance, they have been granted considerable autonomy and been, by and large, free from political meddling and student agitation. While state governments enjoy representation on the Board of Governors, their influence on matters of strategy and recruitment is strictly limited. Chairs of the board tend to have high academic or industry standing depending on the ambitions of the institute. The reliance of IITs on public funding can create bureaucratic challenges and latent dependencies; but these problems are not of the same magnitude as those faced by other universities.

Critical to the success of the IITs and other institutes is the quality of student population reflecting the competitive admission process. At undergraduate level, entry is determined by the flagship IIT-Joint Entrance Examination—which is reputed for its rigor and transparency. Indeed only students who have met a prior level of attainment are allowed to sit the exam. While some have complained about the diluting effects of protective discrimination and the reservation of seats for scheduled castes tribes, the system has managed to uphold quality and meritocracy still carries the day.



Academic programs are also extremely sophisticated: faculty-student ratios are extremely low -around 1:6 to 1:8- which permits greater interaction and – a real luxury by Indian university standards; English is the medium of instruction; there is considerable emphasis on interdisciplinary learning, covering not only basic sciences, technology and engineering but also, in some cases, giving students exposure to philosophy and the social sciences; and careful attention is given to work placements and transition to the labour market through active alumni networks – many of which are registered as public charities.



Emblematic of this approach has been the establishment of Indian Institutes of Management. With almost fifty years of history and benefiting from extensive international collaboration -both the IIM Ahmedabad and IIM Calcutta developed with assistance from the Harvard Business School and Sloan School of Management at MIT respectively- the quality of management education is extremely high and contrasts significantly with other developing countries. It is no a coincidence that a number of Indians have also become deans of major global business schools in the US.





### India's Education System: Areas of Improvement

Nonetheless, these institutions have some way to go before they can be considered world-class. Teaching tends to be stronger than research; while there is a concern that bright scholars are unlikely to join the IIT in favour of more remunerative and highly prestigious jobs in the private sector, both in India and abroad. This is aggravated by the fact that faculty appointed in the early years of the system have retired. Notwithstanding the ability of some IITS to generate additional resources from research and consultancy and alumni donations –IIT Bombay's Industrial Research and Consultancy Center being an outstanding example, many are still highly dependent on government funding. As a consequence, total budgets of the IIT system fall far below the models in the US they seek to emulate. Finally, there is surprisingly little collaboration between IITS which would boost economies of scope and scale.





### India's Education System: Uneven Output in Higher Education

In reality, these institutions are only a smudge on the institutional landscape. For instance, in 2005 seven Indian Institutes of Technology produced just 3,000 graduates annually whereas second tier institutions churned out 207,000 graduates.

Higher education is characterised by a long-tail of under-performing institutions: in 2009, the National Assessment and Accreditation Council found that only 11 per cent universities and colleges met the standards to qualify for a Grade A. Eighty per cent of doctorates in engineering are awarded by only 20 institutions, and 65 per cent of doctorates in sciences come from just 30 institutions.

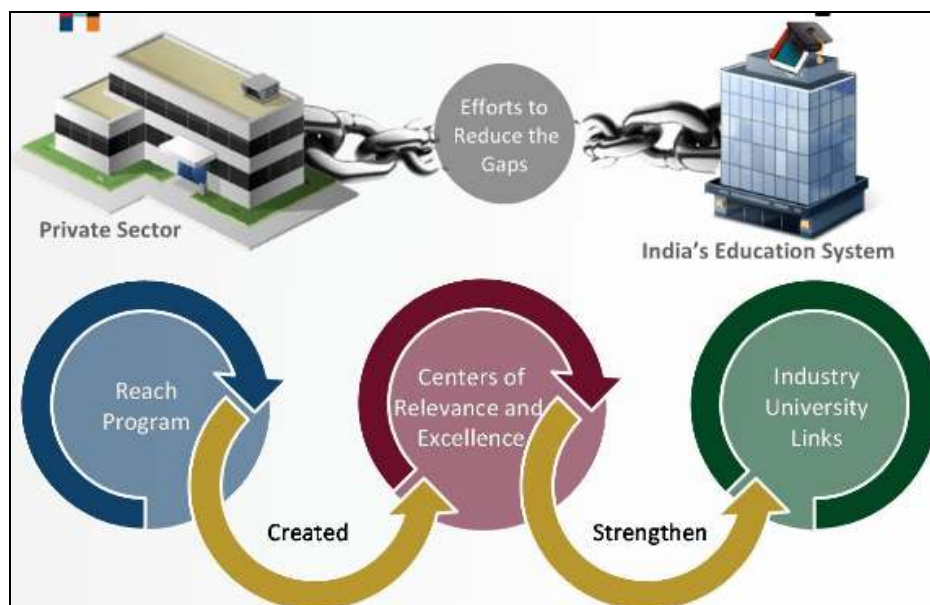


### India's Education System: Reasons for Uneven Output

The uneven output of the system reflects a number of problems, not least restrictive curriculum policies and lack of incentives for professors and institutions –public and private- to upgrade and improve curricula. Over the years, the Central and State Governments have introduced legislation, which has resulted in a multiplicity of regulation, an overlapping of mandates results in confusion and conflict. Shortage of faculty is another problem as higher wages in the private sector have made it for universities hard to recruit and retain talented staff. Finally weak mechanisms for accreditation - has resulted in differing 'academic quality' standards across institutions and underutilization of capacity. Weak links with industry create a mismatch between market needs and worker skills.



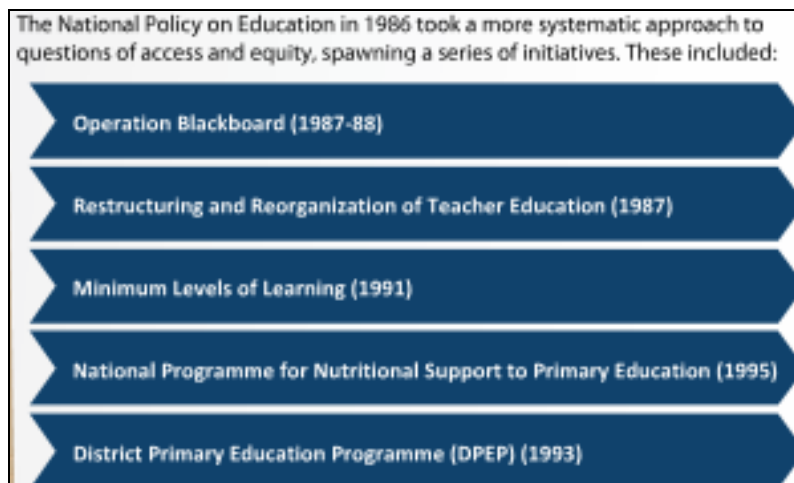
There have been some efforts to reduce the gaps between the private sector and India's education system. The government's Mission REACH program, for instance, has created Centers of Relevance and Excellence in a network of universities to strengthen industry-university links in a variety of disciplines. Similarly, companies like Infosys, Tata Consultancy, and Wipro provide course materials to some institutions and train teachers, enabling them to invest in shorter training times for their employees. However, these initiatives are not representative of the majority of India's higher education institutions.





### India's Education System: Neglect of Primary and Secondary Education

The long-standing prioritization of higher education has created imbalances between different levels of education. Concerns were raised as early as 1964 by the Kothari commission which recommended that the government provide free and compulsory education for all children up to the age of 14. Laudable these recommendations were, most did not receive the resources required to properly implement them. However, the National Policy on Education in 1986 took a more systematic approach to questions of access and equity, spawning a series of initiatives. These included: Operation Blackboard (1987-8), Restructuring and Reorganization of Teacher Education (1987), Minimum Levels of Learning (1991), National Programme for Nutritional Support to Primary Education (1995), District Primary Education Programme (DPEP) (1993). In particular, the Education for All Movement sought to universalize elementary education (grades 1–8) of sufficient quality by 2010. Since 2001, it has brought some 20 million children into school under the world's largest elementary education program. Many of India's states are now approaching universal primary enrolment or have already achieved it.



Attention is turning increasingly to secondary education (grades 9–12) where enrolment remains low at 40 per cent and is creating bottlenecks for the supply of prepared students for tertiary education.

In sum, these are welcome improvements but have taken place from a low base and a legacy of underinvestment. Reading, writing, and arithmetic skills remain low among the literate population. More alarmingly, India is home to more than a third of the world's illiterate population, many of whom are found in the informal sector labor force.

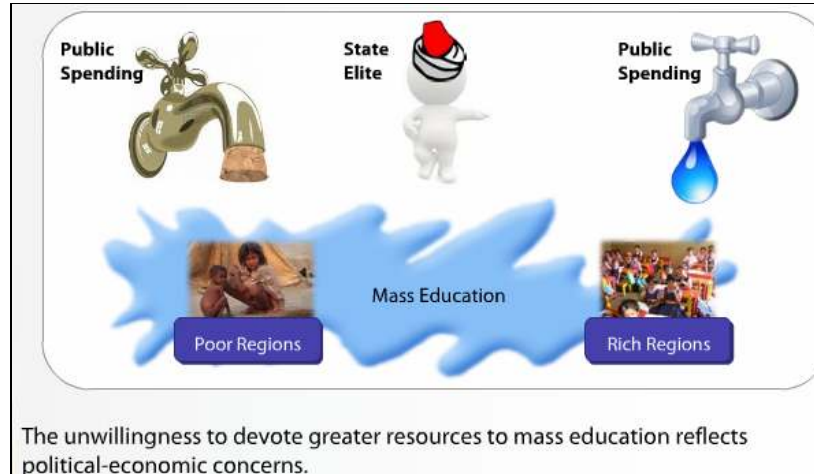




### India's Education System: Structural and Regional Imbalances

Inter- and intra-state disparities in literacy rates in India are particularly salient. Under the Constitution, responsibility for education is shared between central and state governments; but in practice, education is largely state funded. This has tended to aggravate inequalities since states have differing resources to allocate to education. Not surprisingly, the standard of educational facilities and the quality of education are higher in primary and secondary schools in richer states, such as Kerala than poorer ones, such as Bihar.

Underinvestment in education is also maintained by elite dominance over public spending which is closely entwined with the caste system. The unwillingness to devote greater resources to mass education reflects political-economic concerns that education will increase political and economic participation and consequently undermine the power of elites. There is evidence that a higher share of land held by the top 5 per cent of the population in a state is associated with lower investment in mass education.



### India's Vocational Education and Training systems

Government has been keen to reform the vocational education and training system which resembles a closed, centrally planned system for a centrally planned economy. As India has grown, so demand for a number of occupations has grown: administrative, executive and managerial workers, sales workers, low-skill construction workers, skilled workers like toolmakers, and machine and transport equipment operators. While surveys show that Indian firms, on average, do not rank skills and education as the most important barriers to growth and operations, a closer look at the data tells a different story: skills gaps are more likely to be cited by firms in faster-growing regions like Maharashtra, Gujarat, and Tamil Nadu than by firms in laggard regions.

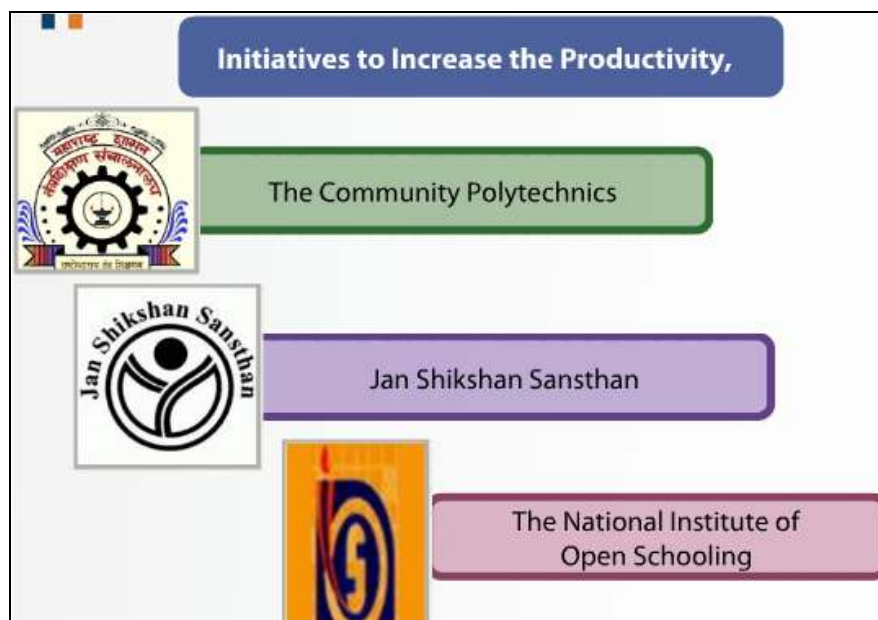




Over 90 per cent of employment in India is in the 'informal' sector, with employees working in relatively low productivity jobs. Provision of appropriate skills to increase the productivity of this part of the workforce thus represents an important intervention. In this regard, a number of initiatives –the Community Polytechnics (training about 450,000 people a year within communities), Jan Shikshan Sansthan (offering 255 types of vocational courses to almost 1.5 million people, mostly women) and the National Institute of Open Schooling (NIOS) (offering 85 courses through over 700 providers recognised by the NIOS)- have been launched, though no systematic evaluation has been conducted regarding their effectiveness.

Changing the perception of vocational education as a dead-end is a major challenge for policymakers. Only a tiny percentage of students in grades 11–12 are enrolled in vocational education; and most see it as a route to higher education, cementing its virtual Cinderella status. Firm investment in worker training is also very low relative to firms in other fast-growing economies.

Better information about the availability and effectiveness of training programs, innovative public-private partnerships to meet the diverse skill needs of very different sectors, a stronger emphasis on general education component of many programs, and attractive financial incentives to provide training will be necessary to put the vocational education and training system on a surer footing.

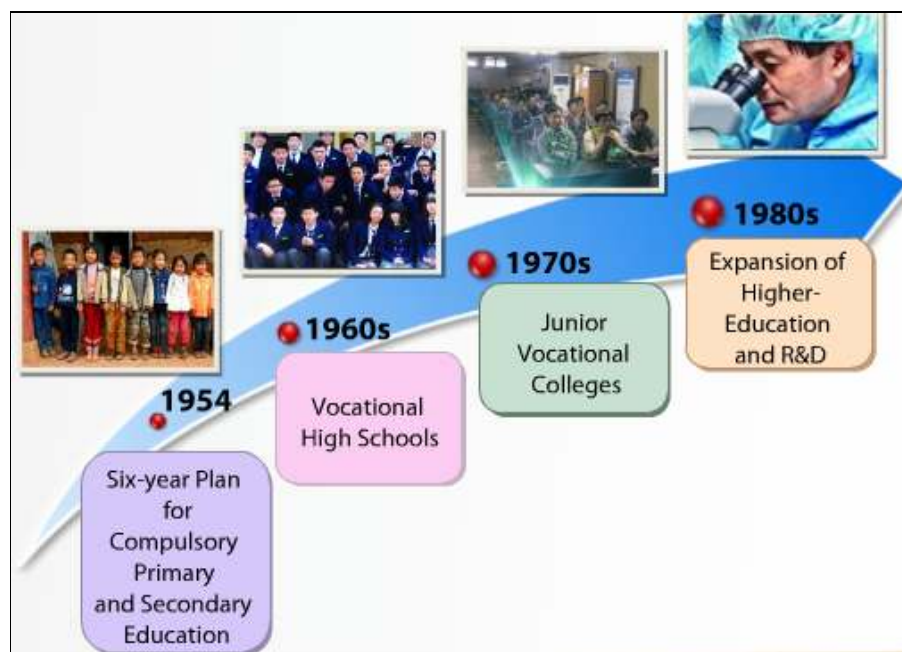




### Korea's Educational Reform: Sequential Path to complement Economic Development

A striking contrast with India's lopsided development contrasts strikingly with the Korean experience. Its approach stands out as more balanced, guided by the human capital needs of the economy. Rather than running before it could walk, policymakers carefully sequenced reform as new priorities emerged. In the first phase, emphasis was given to primary and secondary education, which generated a supply of literate workers to the industries. As early as 1954, a six-year plan was established for accomplishing compulsory education. This was accompanied in the 1960s by new vocational high schools which met the needs of growing labor-intensive light manufacturing industries. In turn, junior vocational colleges were established in the 1970s to supply technicians for the heavy and chemical industries. It was only in the 1980s that reforms focussed on the expansion of higher-education institutions and the supply of high-quality white-collar workers and R&D personnel reflecting and responding the transition to a more knowledge-based economy.

Unlike India, education reform was characterized by a high degree of egalitarianism. In 1968 and 1974, entrance exams to middle- and high- schools were abolished and replaced with random assignment. Both were motivated by the desire to make every school equal regardless of students' academic background, educational conditions, teaching staff, and financing. This built on egalitarian land reforms in the 1940s which ensured redistribution before growth and laid the broad-based foundations for subsequent take-off.



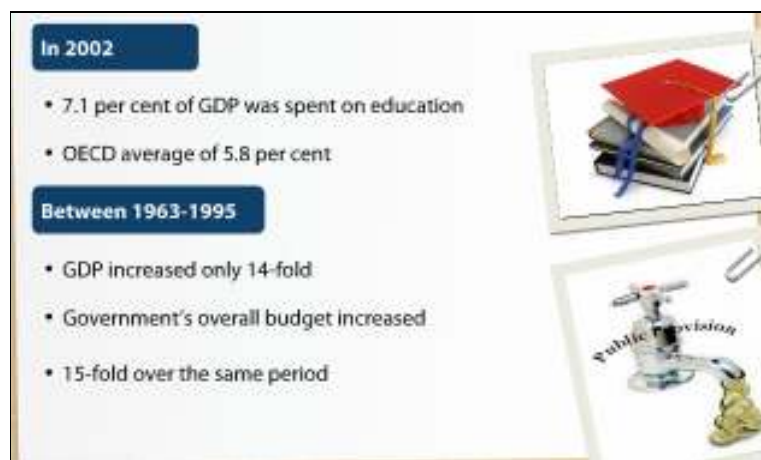




### Korea's Education System: Funding Provision

The high value attached to education and developing a skilled workforce is illustrated by the economy's total expenditure on education. In 2002, 7.1 per cent of GDP was spent on education, significantly higher than the OECD average of 5.8 per cent. Between 1963-1995, public spending on education increased more than 27-fold in real terms, whereas GDP increased only 14-fold and the government's overall budget increased only 15-fold over the same period.

To make expansion fiscally sustainable, the government has required that the private sector, whether households or private foundations, bears a significant portion of total education costs. Most of this has taken place at secondary and tertiary levels, leaving the government free to concentrate resources on strong basic education for all. Strong family and meritocratic values have supported households' willingness to bear these costs and as a result rapid increases in school enrolment. On the other hand, this raises equity consideration insofar as those who can afford private tuition more likely to secure a place in a top-ranked university.



### Korea's Education System: Quality at Primary and Secondary levels

While the government focused initially on the quantitative expansion of the education system, it became more aware of the importance of quality. One of the main strengths of the system are the powerful incentives offered by government to recruit competent people to the teaching profession. Until 1990, public colleges charged no tuition for students training to become teachers. Students were supported for boarding and other educational expenses; and teaching promised greater job security which was especially attractive in times of rapid economic and labor market restructuring.



Just as importantly, the government tightly controlled entry into the teaching profession so that only the top graduates can become teachers. For instance, every primary school teacher must complete a four-year undergraduate degree at the National Education School. Admission onto these courses requires that students should be in the top five per cent of their academic cohort, lifting the attractiveness, status and quality of courses and the profession. Class sizes tend to be bigger in Korea than in other systems, though evidence of a relationship between class size and improvements in outcome is weak. Korea's student-to-teacher ratio is 30:1 compared to an OECD average of 17:1; however, it means that resources can be used to raise teachers salaries without increasing overall funding levels. Starting salaries for primary school teachers are 141 per cent of GDP per capita rising to 389 per cent of GDP per capital, compared to the OECD average of 95 per cent and 159 per cent of GDP per capita.

Many of these initiatives have brought significant benefits as the impressive performance of Korean students in international benchmarking exercises such as PISA and TIMSS routinely demonstrate.





### Korea's Education System: Reforms to improve Tertiary Education

As Korea moved into more knowledge-intensive activity, so reform of higher education also moved up the policy agenda. One long-standing criticism is that too many universities are homogenous, offering little choice. The main thrust of recent regulatory reforms has been to make institutions more entrepreneurial and responsive by granting a greater level of autonomy in, hiring teaching staff, and managing academic affairs and admission numbers. Restrictions on allowing foreigners to become professors at national public universities have been lifted, enabling the flow of high-quality human resources from overseas. Through the New University for Regional Innovation (NURI) program, colleges and universities have been incentivized to find their niche and help has been given to reduce the disruption of restructuring curricula, strategic focus, and missions. To make the system more demand-led, a new regional governance system has been put in place which brings universities and industry closer together and addresses the concern that development has been too centred around Seoul. In a similar spirit, new courses as well as departments may be established under contract between universities and private enterprises.

The contract may stipulate matters related to student quotas, curriculum, teaching and learning methods, and so forth. Upon graduation, students enrolled in the program may then receive favorable employment prospects. Another reflection of the increased need to coordinate education and innovation systems can be seen in the establishment of the Ministry of Education, Science and Technology in 2008 which rationalizes a series of hitherto fragmented initiatives and policies.

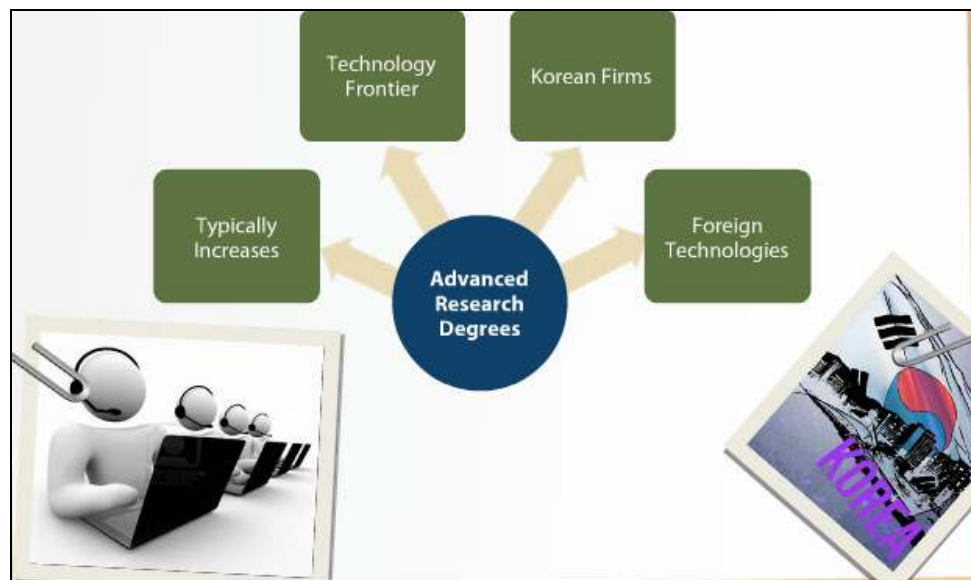




### Korea's Education System: Outstanding Challenges and Weaknesses (1/2)

However, there is a belief that sharp expansion in the number of students attending university has not been accompanied by commensurate improvements in the quality of tertiary education. Notwithstanding efforts to nurture world-class researchers through the Brain Korea 21 (BK21) scheme, it is also felt that there are too many people with bachelor's degrees and too few with master's or doctoral degrees in high-technology fields, especially in SMEs. This concern echoes the finding that demand for more advanced research degrees typically increases as countries reach the technology frontier. the high dependency of Korean firms on foreign technologies. The situation is improving owing to significant increases in investment in basic research in recent years; however, there is some way to go. Korean firms are highly dependent on foreign technologies and the level of import content of Korean exports is among the highest in the OECD and around three times higher than for Japanese exports.

Teaching is also seen as out-dated with too much emphasis on conventional lecture-dominated teaching and rote-learning rather than problem-solving and creative thinking – a tendency reinforced by the high-stakes university entrance exam, the College Scholastic Aptitude Test (CSAT). There is also a perception that students, after the intense demands of the CSAT, do relatively little work at university. Survey evidence shows that Korean students score relatively low in motivational preferences and volition, self-related beliefs, and preference for cooperative learning.







One implication is that high performance of Korean students is attributable less to internal motivation than external factors and may be one factor why Korean students lose the positive learning attitude that is most conducive to real intellectual achievement.

Meanwhile, university ranking systems tend to be crude rewarding the highest status to universities which are not necessarily of the highest quality. Specifically, assessments tend to be applied to entire universities rather than distinguishing between individual departments. The consequence is to discourage efforts to build strong departments in lower-ranked universities.



- High Performance
- Attributable
- External Factors
- Positive Learning Attitude
- Real Intellectual Achievement

### Korea's Education System: Outstanding Challenges and Weaknesses (2/2)

Meanwhile, university ranking systems tend to be crude rewarding the highest status to universities which are not necessarily of the highest quality. Specifically, assessments tend to be applied to entire universities rather than distinguishing between individual departments. The consequence is to discourage efforts to build strong departments in lower-ranked universities.





### Korea Education System: Lifelong Learning Infrastructure

Lifelong learning is another challenge facing the Korean innovation system. Differences in educational attainment of successive generations combined with a looming demographic challenges and the need for restructuring and downsizing after the Asian financial crisis have increased the importance of training and retraining.

In 2007, the government announced a roadmap to enhance lifelong learning capabilities bringing together a number of schemes such as the Education Credit Bank. This allows credits earned through the open educational system to count towards obtaining a formal degree under a new government body, the National Institute for Lifelong Education. The establishment of correspondence high schools, cyber colleges and the Korea National Open University permit adults who have no school-leaving qualification or who wish to return to study to obtain a college qualification or university degree.



### Korea Education System: Formal vs flexible education forms

While these measures have been useful, they struggle to gain acceptance in light of traditional attitudes that still consider formal education to be superior. With an ageing population and excess capacity likely to be created in colleges and universities, policymakers will need to consider how the formal system can be adapted and adjusted to provide shorter-term and more specific programs for adult learners.

However, there are significant problems on the demand-side that may frustrate these initiatives. Notably, the heavily dualistic nature of the Korean labour market split between those in regular employment who are paid in accordance with seniority rather than qualifications, and irregular workers who have no prospects of promotion is a significant barrier to developing an effective lifelong learning system.



- Significant Problems
- Demand-Side
- Initiatives
- Seniority Qualifications
- Irregular Workers
- Promotion
- Significant Barrier
- Lifelong Learning System



### Comparing the Two Education Systems: Successes and Problems

Both India and Korea emerged from colonization and war with the gargantuan task of modernizing their education systems; however we have seen how their philosophy and approach to reform radically differed. Whereas India adopted a supply-driven elitist model, Korea embraced a demand-driven, bottom-up approach.





Both carried costs and benefits: India's islands of educational excellence ushered in an IT boom; but they came at the expense of access and equity, leaving a vast amount of human capital untapped and saddling successive governments with the burden of catch-up. By contrast, the Korean approach provided the human capital needed for rapid industrialization, marrying equity and efficiency. At each stage, it has been able to relax various bottlenecks by successfully piggybacking off earlier investments and achievements. It will need to do so again as it seeks to improve the qualitative performance of the higher education system and increase research productivity. In so doing, this will require government to redefine its role from that of a regulator to that of a facilitator, ensuring greater pluralism and competition between educational institutions.

