

Challenges to China's Education and Training System and the New Global Context

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To put the need for developing a system of lifelong learning for China in context, this chapter begins by summarizing some of the daunting challenges China is facing in education and training. It summarizes some of the key elements of what could be called a knowledge revolution that are making education and training critical elements of competitiveness. It then summarizes some of the key global trends in education and training. It concludes with a section of why investments in education and training are important in this new global context of rapid change and constant restructuring.

The global knowledge revolution

We are in a period of accelerated creation and dissemination of knowledge, in what could be called a knowledge revolution. It has important implications for what countries, especially China, must do with their education and training systems.

Various factors are behind this knowledge revolution:

- Dramatic advances in information technology are reducing the costs of processing and transmitting information—affecting how we produce and distribute goods, how we interact, how we organize our lives.
- Ideas, skills, and brand names are driving the world economy, giving more weight to such intangibles as research and development (R&D), education, training, software, marketing, distribution, organization, and networks.
- Increasing codification of knowledge is based on advances in scientific understanding. Greater information processing power and the ability to simulate reality through mathematical modeling, in turn, speed the rate of scientific advance. We are now engineering new materials at the molecular level. We are also beginning to engineer new life forms. The economic and moral implications of these advances are just beginning to be felt, but they will certainly raise new challenges and opportunities and affect competitiveness and welfare.
- The faster creation and dissemination of knowledge is shortening the time lags between the invention and application of knowledge. The boundary between scientific advance and applications is becoming blurred in biotechnologies, where advances in basic scientific understanding are rapidly being exploited in commercial applications. The reduction of product life cycles is particularly marked in electronics, but occurring more generally across a broad range of products and services, including software.

Challenges to China's Education and Training System and the New Global Contest

- Lower transport and communications costs are changing the organization and distribution of economic activity. It is almost as cheap to communicate with someone halfway around the world as with someone in the same city. Advances in transport technologies, including containerization and bulk transport, and more fuel efficient cars, ships, and airplanes are reducing the costs of transporting even bulky cargos around the world.
- The world is becoming one large integrated market. The share of trade (imports and exports) has increased from 38 percent of global gross domestic product (GDP) in 1990 to over 52 percent today. Most products are now sourced and distributed globally.
- There is greater competition in almost all markets. Production is outsourced to the lowest cost producer, which for many products is now China. However, competition in the production stage is intense, and profits are driven down to near zero as products become standardized. Value added now comes from the upstream activities (innovation, design, engineering) and the downstream (marketing, branding, distribution, managing information about market and consumer needs and the whole value chain).
- Competitiveness is increasingly based on innovation in products, processes, and organization for production and distribution in high-level human capital. Investments in such intangibles as R&D, education, and software now equal those in hardware among OECD countries.
- Innovation and higher education are now more important for economic growth. Economic studies of growth have found that innovation and productivity increase due to education, and better ways of producing things account for a greater share of economic growth than increases in simple capital and labor inputs in production.

This new wave of change puts pressure on keeping up with new knowledge and restructuring economic activities. This in turn puts a premium on the education and skills of a country's population to make effective use of new knowledge and to be able to create as well as to adapt knowledge to changing needs.¹ Hence, we are in the knowledge economy or the knowledge society.² Greater attention is placed on how knowledge is created, acquired, transmitted, and used more effectively by individuals, enterprises, organizations, and communities to promote economic and social development.

The knowledge economy relies primarily on the use of ideas rather than physical abilities and on the application of technology rather than the transformation of raw materials or the exploitation of cheap labor (World Bank HDNED 2002). Transforming the demands of the labor market in economies throughout the world, it requires that every citizen constantly update, absorb, and apply new knowledge and skills. Schools and training institutions thus need to

¹ It also puts a premium on the incentive and institutional regime that allows resources to be deployed to the most efficient uses, a dynamic information infrastructure, and an effective innovation system. For an overview of the challenges placed by the knowledge revolution on China in all these areas, see Dahlman and Aubert (2001).

² Knowledge has always been important for economic growth. The term knowledge economy was developed by the OECD in its 1996 publication on Employment and Jobs. For an application of this concept to China, see Dahlman and Aubert (2001).

prepare workers for lifelong learning. Educational systems need to put more focus on developing decision-making and problem-solving skills and teaching people how to learn on their own and with others.

This change poses serious challenges to China on two counts. One is the stock problem—how to provide massive training to the world's largest labor force with relatively low educational attainment. The second is the flow problem—how to upgrade the quality of the educational system to give new cohorts going through it the skills necessary to compete in the knowledge economy.

All these changes call for a new and more effective model of education and training—a model of lifelong learning. The rest of this chapter will summarize some of the key global trends in education and training and why investments in education and training are important. The next chapter will lay out why it is important to develop an effective system of lifelong learning to cope with the changes.

Global trends in education and training

The total global education and training market, at about \$2.3 trillion, is growing rapidly.³ In total spending, about a third of the market is in the United States, only 15 percent in developing countries. In numbers, the large majority of persons studying or receiving training is in developing countries.

The total number of students in primary and secondary education worldwide was 1.2 billion in 2002, the total in higher education in 2002 was 100 million,⁴ and in 2005 110 million, with China responsible for 70 percent of the increase.⁵

The new trends include the following:

- ***Education as a source of competitive advantage and social participation.*** Investment in human capital is critical for economic competitiveness and growth. With rapid advances in knowledge, technology and skills are becoming the key drivers for development. Evidence shows that the link between education and economic growth strengthens as the rate of technology transfer increases, suggesting that technology adoption is strongly linked to the education of the labor force. The threshold level of human capital accumulation beyond which a country may experience accelerating growth is estimated at a literacy rate of about 40 percent. Once countries reach this level, they can increase growth by opening their economies to technology transfer, as Costa Rica has done (World Bank HDNED 2002). Education also has an important effect on civic participation and social cohesion. More-educated citizens are more likely to participate in

³ It is estimated by the authors that the market is growing at about 10 percent a year.

⁴ Authors' calculations based on the most recent data available from UNESCO Statistical Institutes, <http://stats.usis.unesco.org/TableViewer/tableView.aspx> (accessed February 2006).

⁵ Estimates by Ron Perkinson, International Finance Corporation (IFC), at IFC Higher Education Forum, February 2006.

the political process and contribute to social development. For these reasons, most OECD countries have increased their public expenditures on education (table 1.1).

- **Higher enrollment rates, especially in higher education.** As the economy and industries increasingly shift toward knowledge-intensive directions, the demand for high skills and competencies increases significantly. The 1970s trend of declining rewards to higher education and falling rates of return to schooling reversed in the United States and other developed economies in the 1980s and 1990s. The gap in wages between educated and less educated workers widened significantly during the 1980s. Enrollment, especially in higher education, increased dramatically (table 1.2). China's higher education enrollment rates increased more rapidly than those of any other country over this period.
- **Older students in higher education.** In the more developed countries there is a marked trend toward older students in higher education. In the United States more than 5.9 million (39 percent) of the students in higher education programs in 2004 were over the age of 24, and that number is projected to reach 6.6 million in 2007 and 6.9 million in 2012. In Canada 30 percent of undergraduates were over 25 years old. In Australia, New Zealand, Denmark, and Sweden more than 20 percent of first-year university students were over 27 in 2000 (Perkinson 2005). Many are getting work experience before going to school, and many others are going back to school to get the specialized education they need to improve their job prospects or productivity. China is going to be facing a similar expansion of demand for higher education by persons beyond the normal age cohort as adults need to go back for specialized degrees that are required by the changing needs of the economy and the job market.

Table 1.1. Public education spending as a share of GDP (percent)

	1990	2003
Austria	5.3	5.5
Belgium	4.9	6.2
Canada	6.5	5.2 ^a
Denmark	7.0	8.4
Finland	5.5	6.5
France	5.3	6.0
Greece	2.4	4.3
Italy	3.1	4.9
Japan	3.5 ^b	3.7
Korea, Rep. of	3.4	4.6
New Zealand	6.1	6.7
Portugal	4.1	5.9
Spain	4.2	4.5
Sweden	7.2	7.0
Switzerland	5.1	5.4
United States	5.1	5.9
China	2.3	3.2

Source: World Bank DDP database.

a. 2002 figure.

b. 1992 figure.

- **More participation of workers in continuing education.** Most workers require supplementary skills to remain competitive in their current jobs. This makes continuing

education indispensable to maintaining professional qualifications and employability in a constantly changing job market. In Denmark, Finland, Sweden, and Switzerland around half the labor force participated in some form of nonformal, job-related continuing education and training within the 12 months before a 2003 survey, and more than two-thirds if informal training was added. This training is more common in large firms, the public sector, and services. It is also more usual for full time workers, increasing in line with initial level of qualifications (OECD 2005b).

- **Increasing private provision of education and training.** Public education and training systems have not been able to respond to increasing demand for formal education and training. The share of tertiary spending from private sources has risen in many countries. Overall, the share of funds from private sources for tertiary education was 22 percent in 2002 (OECD 2005b), reflecting higher student tuition in public tertiary institutions and the greater number of and enrollment in private tertiary institutions. In China, with limited public resources for education and training, private providers will increase their share.

Table 1.2. Rising secondary and tertiary enrollments (percent)

	<i>Secondary</i>		<i>Tertiary</i>	
	1990	2004	1990	2004
OECD average	94.4	101.4	48.1	71.2
Australia	81.7	148.6	35.5	72.2
France	98.5	110.6	39.6	56.0
Japan	97.1	101.6	29.6	54.0
Korea, Rep. of	89.8	90.9	38.6	88.5
United Kingdom	85.5	104.5	30.2	60.1
United States	93.1	94.8	75.2	82.4
<i>Developing countries</i>				
China	48.7	72.5	3.0	19.1
Brazil	38.4	102.0 ^a	11.2	22.3 ^a
Thailand	30.1	82.5	16.7	41.0
Mexico	53.3	78.8	14.5	23.4

Source: World Bank DDP database.
a. 2003 figure.

- **Increasing competition in provision of education and training.** In addition to the rapid increase in private providers, particularly in higher education and training, there have been more new entrants, including publishers, the education and training arms of manufacturing or producing firms, and new information and communications-based providers, many from abroad. The Chinese education and training system is beginning to see this competition, which will intensify.
- **Internationalization of higher education and training.** International student enrollment is increasing, particularly at the higher education level. There also are more faculty and student exchanges. Internationalization has also increased the number of institutional

relationships and alliances across countries, many of them leading to commercial initiatives by public and private providers, setting up schools, university campuses, and training facilities in foreign countries, and providing education and training through distance learning technologies, including the Internet. The European Union has been developing a credit transfer system for both university and vocational education degrees. There are also efforts to develop international qualifications, quality assurance and certification systems to provide greater information on the skills required for different jobs, greater portability of qualifications, as well as greater consumer protection from low quality provision and qualifications. China will have to develop a good strategy and enter international agreements to take advantage of the internationalization of higher education.

More use of information and communications technologies (ICTs) in formal and continuing education. In some countries the move toward distance learning technologies was initiated by governments to reduce costs and extend coverage to masses of students. This is the case for the Radio and TV University in China, the UK Open University, and Telesecundaria in Brazil, originally based on radio or TV technologies. As ICTs become accessible and affordable, more countries are taking advantage of these new technologies to deliver education and training efficiently and flexibly. Many traditional in-classroom courses and training programs can now be taught through distance learning and the Internet.

In the United States there were 1.9 million higher education distance learning students in 2003, 2.6 million in 2004, about 40 percent of them fully online (Perkinson 2005). Some estimate that the online e-learning sector will become a global \$150 billion plus industry by 2025.⁶

Given China's massive needs in education and training, the effective use of ICTs is a strategic necessity. China is well placed to do this—and could become a world leader.

- ***Growing need for training in ICT skills.*** ICT skills are becoming a new core skill, just like reading, writing, and arithmetic. The use of computers at an early age helps students to learn ICT skills, which can then be used in the education process. For example, 77 percent of Swiss students reported using a computer several times a week to prepare for their courses (OECD 2002b). Significant “learning effects” occur with experience using ICTs, and productivity gains increase with training (World Bank HDNED 2002). China needs to build these skills into its formal educational curriculum at all levels. It also has to expand the provision of these skills for persons who have already left the formal educational system.

Why invest in education and training?

People need more education and new skills to use new technologies. And, to produce new knowledge, they need more specialized tertiary education. More educated people tend to adopt new technologies faster. And despite very rapid increases in the supply of higher education in most countries of the world, the gap has not narrowed between the earnings of college graduates

⁶ Perkinson (2005) citing MOE 2000.

relative to those of persons who only finish secondary school. Why? Because higher order skills are necessary to make effective use of new technologies.

Higher earnings

Studies for most OECD countries show a strong positive relationship between educational attainment and average earnings. Graduates of tertiary-level education earn more than upper secondary and post secondary graduates. The earning differentials between graduates of tertiary and upper secondary education are more pronounced than those between upper secondary and lower secondary or below, “suggesting that in many countries upper secondary forms a break point beyond which additional education attracts a particularly high premium” (OECD 2005b, p. 118). Variations across countries reflect the supply of persons with the different levels of education, the needs of the economies, the minimum wage legislation, and the power of unions.⁷ For example, the earnings premium for males ages 25–64 with tertiary-level education ranged from 27 percent in the Republic of Korea to 174 percent in Hungary. And in most countries the share of individuals in the lowest earning categories falls as the level of educational attainment increases (OECD 2005b).⁸

Internal rates of return to investments in education also generally show that investments in education are attractive. Careful studies on OECD countries have differentiated between private, fiscal, and social rates of return.^{9,10} There is great variation across countries in the extent to which education is public or private, and in the marginal tax rates (the Nordic countries tend to provide more free public education, but they also generally have higher marginal tax rates). The results indicate that:

- In all countries private rates of return to upper secondary or postsecondary nontertiary were positive, often explosive, and higher than for tertiary education. Private returns to tertiary education were above 10 percent for 4 of the 10 countries, but always above 4.8 percent.¹¹

⁷ There is a gap in earnings between males and females suggesting gender discrimination in education and employment, though part of the earnings gap may be explained by different career and occupation choices. However, within the same gender the positive earnings differences with respect to higher educational attainment hold.

⁸ More education does not guarantee that an individual will earn more. There are wide earnings' dispersions for individuals with the same level of education within countries and across countries. Many factors, including individuals' abilities and skills other than those indicated by educational attainment, as well as experience, may account for some of the differences.

⁹ Private rates of return are based on the addition of more education to the after tax earnings, net of private tuition, and the opportunity cost of forgone earnings. The costs in fiscal internal rates of return include public direct and indirect expenditures on education, plus lost tax revenues on students' forgone income. The benefits are increased revenues from taxes on higher wages. Social costs of return are the sum of the private and the fiscal. But they are an underestimate because they do not include possible externalities coming from additional education such as reduced health costs, greater social cohesion, more informed and effective citizens, and the like. For the methodology used in the calculation of the rates of return, see www.oecd.org/edu/eag2005.

¹⁰ See also De la Fuente and Ciccone 2002.

¹¹ The OECD methodology also included the hypothetical case where a 40-year-old individual goes for a higher level of education. The results show that for this hypothetical case the returns to completing tertiary education were generally higher than for completing upper secondary.

Challenges to China's Education and Training System and the New Global Contest

- Fiscal rates of return are generally lower than private rates of return because the state often pays for part of the education.
- Social rates of return for completing secondary education exceeded 20 percent in 3 countries (the Netherlands, Sweden, and the United States) and were less than 10 percent in only 1 of the 10. Social rates of return at the tertiary level exceeded 8 percent in 4 of the 10 countries (Finland, Italy, the Netherlands, and the United States) and were lower than 5 percent in only 1 country (OECD 2005b).¹²

Thus, the private and social rates of return are generally higher than the risk-free real interest rate, indicating that investments in education are worthwhile. But returns on human capital accumulation are not risk free, as indicated by the wide dispersion of earnings among the better educated. So, some individuals contemplating investments in education may need a compensating risk premium, which may require policy intervention to alleviate the constraints (OECD 2005b).¹³

Higher productivity

Better educated workers are generally more productive and may also raise the productivity of coworkers. Higher stocks of human capital facilitate investments in physical capital and enhance the development and diffusion of new technologies and raise output per worker (OECD 2005b).

Studies tracing the relationship between the stock of education and the long-run level of GDP find that a one-year increase in average educational attainment raises the level of output per capita between 3 and 6 percentage points. Studies examining the relationship between the stock of education and the rate of growth of GDP find that an increase of one year of education raises the growth rate of GDP by around 1 percentage point.¹⁴ The cumulative impact of a 1 percentage point increase in the rate of growth soon exceeds the one time increase in output.^{15 16}

¹² For the scenario in which males stay at work but study part time, the social rates of return for completing upper secondary were higher than when they completed studies on a fulltime basis because society does not bear the full loss of output. In all scenarios, the social rates of return are almost always higher for males than for females.

¹³ These policy interventions include subsidizing part of the costs of education as well as facilitating student access to credit.

¹⁴ However, research suggests that there are diminishing effects on growth above an average of 7.5 years of education. See Krueger and Lindhal (2001).

¹⁵ The first studies are based on neoclassical growth theory, the second on the new growth theory. See OECD (2005b).

¹⁶ There are also conceptual and data difficulties. The key conceptual issue is whether more education increases growth or whether growth causes persons to invest more in education. In practice causality operates in both directions. The data difficulties arise from the use of imperfect proxies for human capital such as years of education, adult literacy rates, and school enrollment ratios, which do not fully capture the quality of education or the skills and competencies acquired by on-the-job training, experience, and other informal channels, as well as the atrophy of skills caused by disuse. Some recent work has used the results of OECD's Adult Literacy Survey as the measure of education and skills. It indicates that literacy scores perform better in growth regressions than indicators of schooling. A country able to attain scores 1 percent higher than the international average achieves labor productivity 2.5 percent higher and GDP per capita 1.5 percent higher than the average (Coulombe, Tremblay, and Marchand 2004).

Rising labor productivity accounted for at least half of GDP per capita growth in OECD countries from 1990 to 2000 (OECD 2005b).

Other benefits

Many analyses show a positive causal relationship between higher educational attainment and better mental and physical health. More-educated people tend to have lower rates of unemployment and to get jobs with higher income. With higher income they can spend more on health. More-educated workers also tend to have greater awareness of health and to take better care of themselves. Education can increase a person's self-esteem, problem-solving and social skills, and the capacity to respond to adversity. And higher educational attainment can increase the health of children.¹⁷

In addition, there is a positive effect on social cohesion. Research has shown a positive relationship between literacy and participation in voluntary community activities, and between greater civic knowledge and higher levels of civic participation (OECD 2005b).

Training

There is some evidence that investments in training raise worker wages and increase productivity at the enterprise level (World Bank HDNED 2002). There is also some evidence that training increases economic growth, not just because of the productivity increases in the individual enterprises where the workers work, but also because of positive externalities to the rest of the economy (World Bank HDNED 2002).

China's daunting challenges in education and training

China has begun to readjust its education and training system to cope with challenges in moving to a knowledge economy. In its Eleventh Development Plan, it has defined three areas as strategic priorities for educational development: universalizing compulsory education, promoting vocational education, and improving the quality of higher education (Wen 2005b). As critical parts of the lifelong learning system, all three need to be implemented with proper institutional, curriculum, and pedagogical reforms.

To understand better what China needs to do, it helps to summarize the challenges it faces in education and training and the implications for lifelong learning:

- Competitive pressure from China's integration into the global economy
- The enormous education and training needs of a very large population
- Low overall educational attainment
- Large regional disparities
- The continuing transition to a market economy
- Massive structural change, restructuring, and rising unemployment

¹⁷ Research shows positive associations between higher levels of education and healthier dietary practices, lower rates of smoking, lower use of alcohol, more exercise, and even more use of seat belts when driving (OECD 2005b).

Challenges to China's Education and Training System and the New Global Contest

- Financing constraints on government to address massive resources needed for upgrading education and training.

Competitive pressure

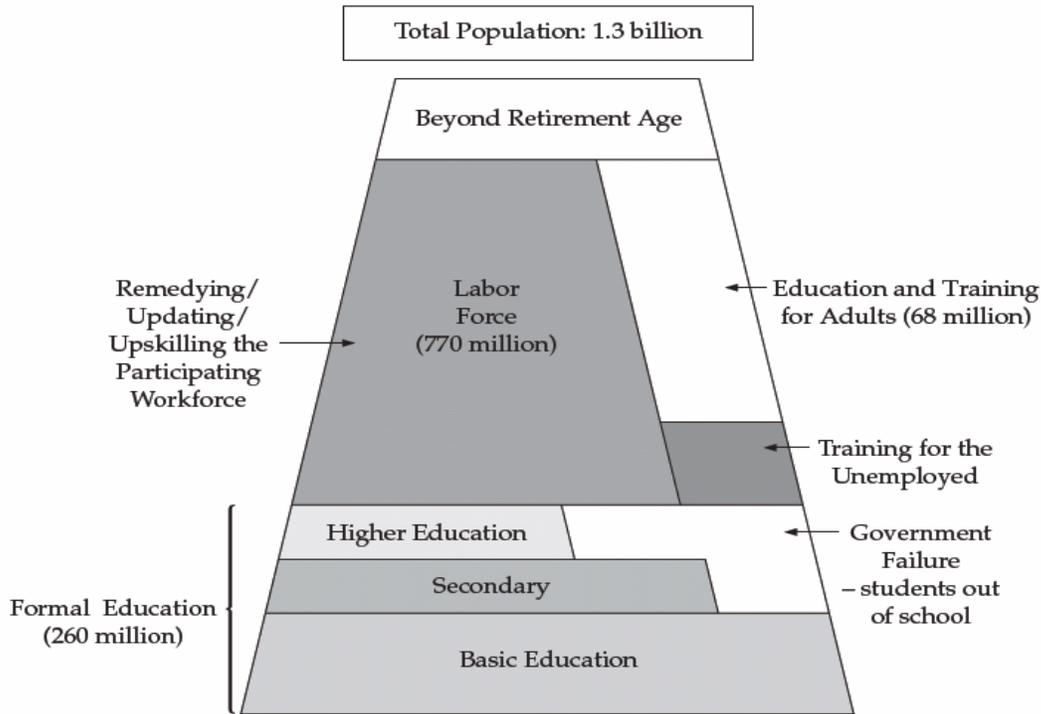
Following its accession to the World Trade Organization (WTO), China is further opening up to international competition, so it needs to realign its domestic resources in light of international comparative advantage. Still mainly relying on labor-intensive manufactures, it needs to move up the global production value chains and strengthen the contribution of total factor productivity in economic growth. This will require major structural and institutional readjustments. Despite advances in improving resource deployment, domestic markets for goods, services, labor, and capital are constrained by rigidities that create obstacles to agglomeration and further structural adjustments, retarding broadly based improvements in productivity. China needs to address these rigidities and further restructure state-owned enterprises and improve the efficiency of the financial sector and the labor market.

Large size

China has the world's largest education and training market, growing at unprecedented speed. Of its 1.3 billion people, based on a rough estimation, about 80 percent need or are undertaking some type of education or training. This includes about 770 million workers who constantly need new and better skills to keep productive employment and remain competitive, 260 million students in the formal education system from kindergarten to tertiary education, and 68 million adult learners attending various nondiploma adult schools or training institutions (figure 1.1).

In 1990–2002 the average growth of China's total population was 1 percent a year, while that of total formal school enrollment was 2 percent, tertiary education 13.1 percent, and secondary education 5 percent. Adult education enrollment has been growing at 5.2 percent, with adult tertiary education at 10.6 percent and adult technical training at 16.3 percent (Hu 2004).

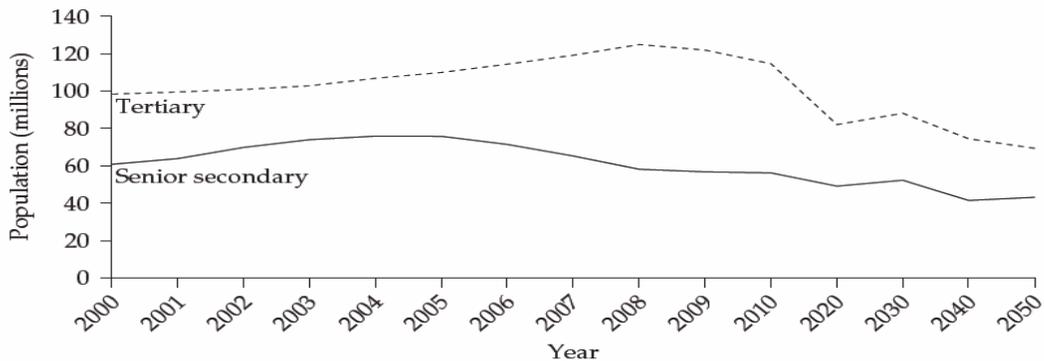
Figure 1.1. China's population by education need



Source: Authors' research.

With the rapid expansion of tertiary education, the total number of students at the tertiary level (including nonformal) reached 23.8 million by 2004, more than that of the United States and about 22 percent of the world's total.¹⁸

Figure 1.2. Trends for China's school-age population



Source: MOE 2003.

Note: Figures after 2004 are projections.

¹⁸ China Statistic Yearbook (2004) and author's calculations.

The projections for the future demand for education in China are even more dramatic. According to the simulation modeling results of the Working Group on China Education and Human Resource Report in 2003, led by the Ministry of Education, China's population will peak at about 1.5 billion in 2040. School-age populations at senior secondary (15–17) levels will peak around 2004 (at 75.9 million), and at tertiary levels (18–22) around 2008 (at 124.9 million) (table 1.3 and figure 1.2). China's school-age populations at the primary and junior secondary levels peaked in 2004 at 124.3 million and 65.5 million, respectively (L. Zhang 2004).

Table 1.3. Projections of China's school-age populations, 2000–2050

	<i>Total population (billions)</i>	<i>Senior secondary (millions)</i>	<i>Tertiary (millions)</i>
2000	1.27	60.81	98.37
2001	1.28	63.90	99.53
2002	1.29	69.84	100.85
2003	1.29	73.95	102.82
2004	1.30	75.87	106.82
2005	1.31	75.77	109.95
2006	1.32	71.43	114.40
2007	1.33	65.29	119.17
2008	1.34	58.15	124.88
2009	1.35	56.75	121.92
2010	1.36	56.19	114.63
2020	1.43	49.15	82.08
2030	1.47	52.29	88.12
2040	1.48	41.45	74.43
2050	1.46	43.16	69.38

Source: MOE 2003.

Fulfilling the needs of such a huge and rapidly growing education and training market would be a daunting challenge for any country, but even more for China, still a lower-middle-income country.

As China looks ahead it needs to take into account its changing demographic structure (see annex 1). First, because of the one child policy, the 1–4 and 5–9 age cohorts are already smaller than the succeeding older cohorts, implying overcapacity in elementary education. Second, a bubble in the 15–21 age cohort, combined with increasing enrollment in secondary and higher education, means that these levels will have to be expanded. In the not-too-distant future, there will also be excess capacity at the secondary level. Third, at the tertiary level there is a need to continue to expand the system—not only to accommodate higher enrollment of tertiary level cohorts, but also to respond to the demands of adults returning for more specialized tertiary education. Fourth, by 2020 the population above retirement age will be nearly as large as the school-age population. And by 2050 it will be even larger than the formal education cohort of the population below 25—and likely to demand new forms of education and learning.

Low educational attainment

China has improved the educational attainment of its population over the last two decades (figure 1.3). By 2003, for those ages 6 and above, 51.4 percent had attained secondary education and 5.5 percent tertiary education (MOE 2005a). From 1990 to 2004 the gross enrollment rate for junior secondary increased from 67 percent to 94 percent, senior secondary from 22 percent to 47 percent, and tertiary from 3 percent to 19 percent (table 1.4).

Despite the progress, the overall educational attainment of the population is still low by Organisation for Economic Co-operation and Development (OECD) standards. This constrains the country's ability to absorb new knowledge—to maintain and increase competitiveness and to redeploy workers from low productivity to higher productivity jobs. In 2003 China still had an illiteracy rate of about 11 percent (female 15.9 percent).¹⁹ In 2001 the average years of education of the total labor force was 8.0, and only 4.7 percent had education at the college level or above. In OECD countries the corresponding figures were 11.7 years and 24 percent (figures 1.4a and 1.4b). In China's agriculture only 0.4 percent of the labor force had college or above education in 2004, manufacturing only 6.7 percent (China Labor Statistical Yearbook 2005).

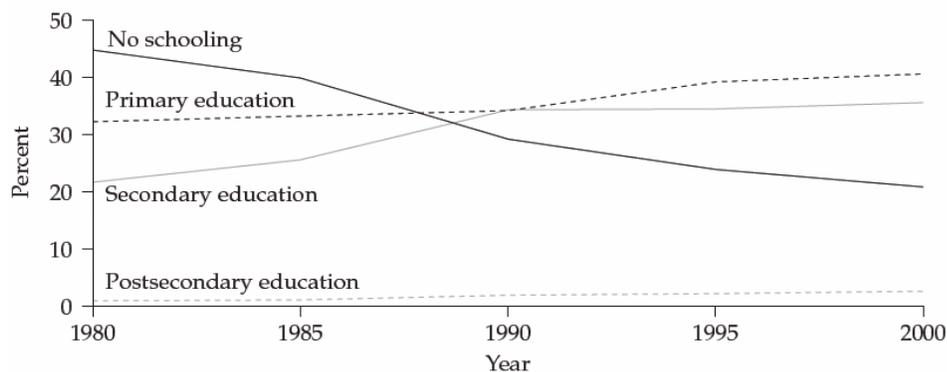
Large regional disparities

Although China's overall literacy rate has improved significantly in recent decades, there are widening disparities among provinces and within provinces. The coastal regions are richer in educational levels and resources, from both the public and private sectors. The differences in illiteracy among the provinces are huge, with the illiteracy rate of western provinces as high as 21–40 percent and most coastal regions below 10 percent. The education of the labor force also varies widely across regions (table 1.5). And secondary enrollment rates are unequal among provinces (figure 1.5). In 2000 Shanghai and Beijing had enrollment rates close to 90 percent; Tibet, Guizhou, Guangxi, and Hainan a third lower.

The urban-rural average income ratio was 3.21 in 2004, almost twice the 1.72 in 1985 (World Bank 2005c). In 2000, in terms of educated population per 100,000 people at tertiary level, the urban rate is 18 times more than the rural rate; at senior secondary level 4 times more. The average education of the rural labor force in 2002 was 7.3 years; that of the urban 10.2.

¹⁹ Based on 2003 national sample survey data of population age 15 and above. Cited from MOE 2004b.

Figure 1.3. Educational attainment of the Chinese population ages 25 and over, rising over time



Source: Barro and Lee 2000.

Table 1.4. Educational enrollment and literacy rate

	1980	1990	2000	2004
Primary (net, percent)	93.0	96.3	99.1	98.9
Junior secondary (gross, percent)	—	66.7	88.6	94.1
Senior secondary (gross, percent)	—	21.9	38.2	46.5
Tertiary (gross, percent)	—	3.4	12.5	19.0
Adult literacy rate (population age 15 or above, percent)	68.1 ^a	—	84.9 ^b	89.0 ^c

Sources: China Educational Statistics Yearbook 2000, 2004; and MOE 2003.

Note: — = not available.

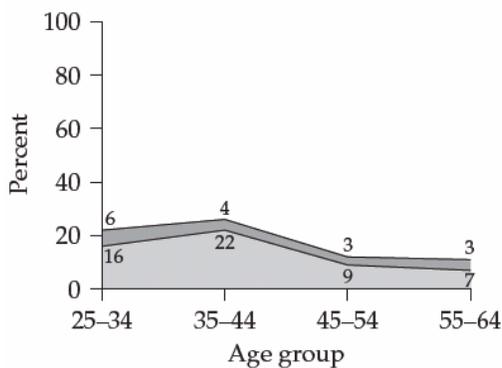
a. 1982 figure.

b. 1999 figure.

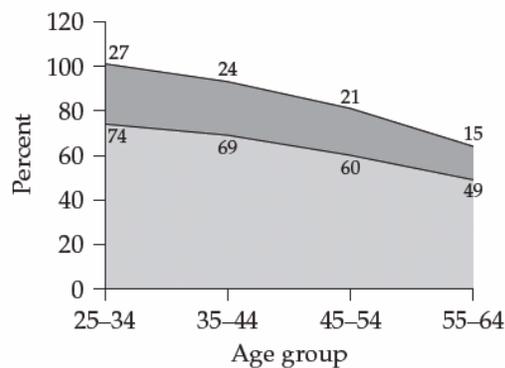
c. 2003 figure.

Figure 1.4. Average educational attainment still low, especially for the working-age population

a. China: Percentage of the population that has attained upper secondary or tertiary education, 2001



b. OECD: Percentage of the population that has attained upper secondary or tertiary education, 2001



□ Upper secondary ■ Tertiary

Source: OECD 2003a.

Continuing the transition to a market economy

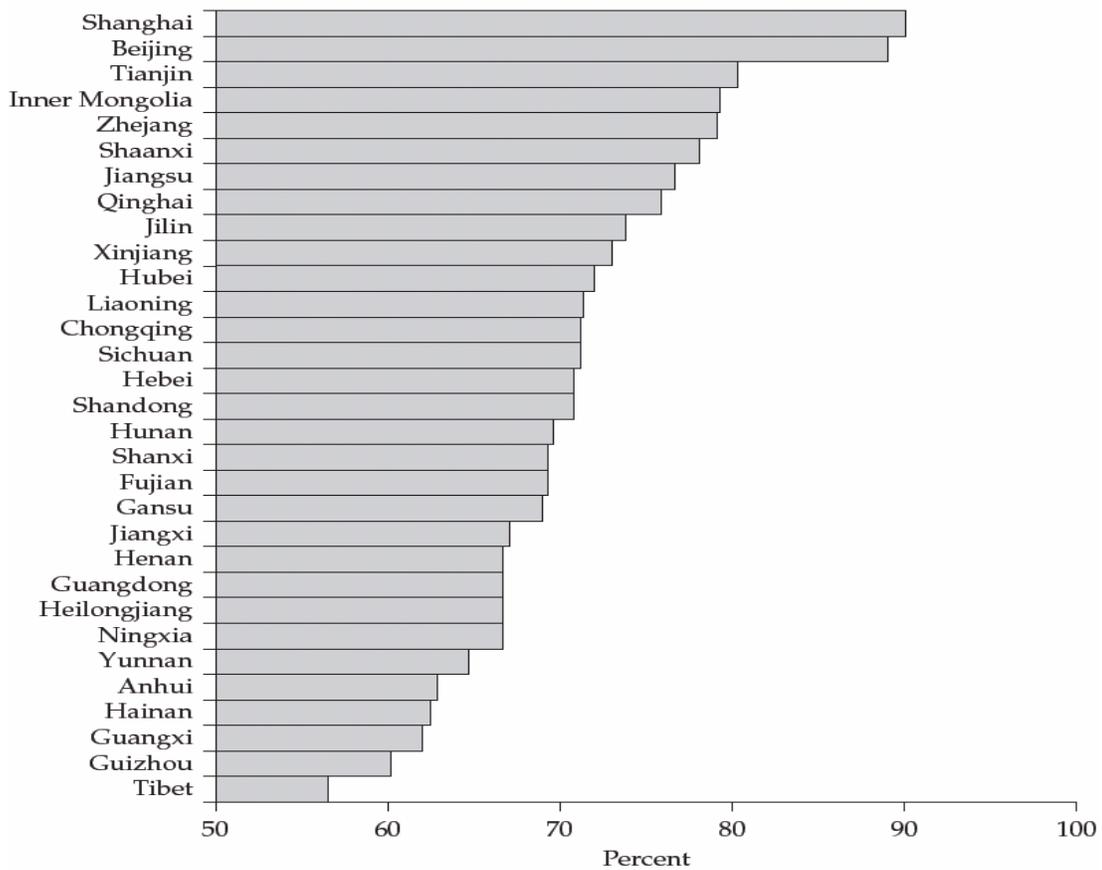
It has been a quarter of a century since China embarked on a transition to an internationally open market economy, sparking enormous social, political, and economic change. Major reforms transferred land to households and under the household responsibility system, allowed farmers to transfer their rights to land. They also encouraged the private sector through the privatization or new management of state-owned enterprises and the recognition of private property and ownership (endorsed by a constitutional amendment in March 2004).

Table 1.5. Education levels of the labor forces by region, 2004 (percent)

Regions	Illiterate	Primary	Junior secondary	Senior secondary	College or above
East	4.1	20.8	45.6	18.0	11.6
Middle	4.5	25.7	49.3	13.9	6.6
West	14.2	35.7	33.2	10.2	6.7
National average	6.2	27.4	45.8	13.4	7.2

Source: Author's calculations based on data from China Labor Statistical Yearbook 2005.

Figure 1.5. Secondary enrollment by province



Source: MOE 2001.

Challenges to China's Education and Training System and the New Global Contest

These changes set free enormous new productive forces, giving the country a competitive advantage globally. The market-oriented transition also engendered a huge demand for new skills and competencies, once ignored in the former planned economy, when students were assigned to jobs on graduation.

A quick comparison of standard occupational classifications for the United States and China reveals the existing skills gap between a mature market economy and a transitional economy (table 1.6).

With China's rapid transition to a market-based economy, the high-skill occupations common in the United States are being or soon will be created in China, building the high demand for new skills and competencies. Only a highly effective and efficient lifelong system can meet such demand.

Massive structural change, restructuring, and rising unemployment

China's economy has been growing at more than 9 percent a year, changing the economic structure. From 1980 to 2004, China's agricultural output dropped from 30 percent of GDP to 13 percent, and the service sector increased from 21 percent to 41 percent; from 1980 to 2002, agricultural employment as a share of total employment decreased from 69 percent to 43 percent, and service employment increased from 12 percent to 29 percent.²⁰ This trend will continue at a similar or even faster pace in the future (figure 1.6). By 2020 China will be a more industry- and service-oriented economy, requiring a labor force with new skills and qualifications geared to a knowledge-based economy. China's education system needs to adapt to this change and face up to the challenges, with multiple pathways and providers, flexible but sound qualification recognition systems, and new curricula and pedagogies.

With this structural change, about 12–15 million people move each year from agricultural activities to nonagricultural activities and cities, resulting in about 300 million more by 2020 (Cooper 2004). And with industrial restructuring and state-owned enterprises reform, millions of workers have been laid off, and the unemployment rate is skyrocketing. The need is urgent for large retraining and reskilling programs for rural migrants and those laid off.

Technical workers now account for only one-third of total industrial workers, most of them junior technicians. Engineers and advanced engineers account for only 4 percent of the technical workers, a bottleneck for China's industrial upgrading. The Chinese government listed vocational education as one of its strategic priorities in addition to universalizing compulsory education and improving the quality of higher education. A recent conference defined the principles and objectives for developing vocational education in the next few years (box 1.1).

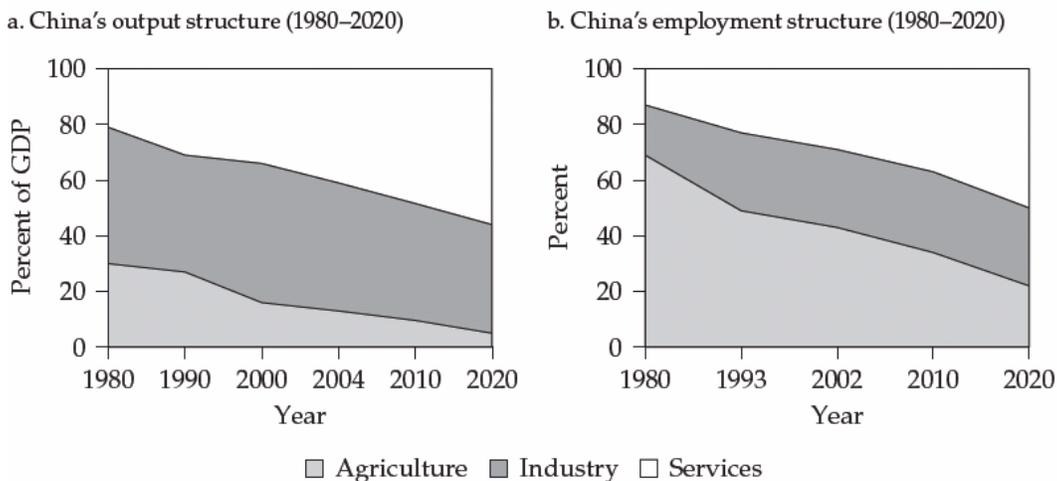
²⁰ China has revised the size of its economy upward. Using data from a 2004 economic census, statisticians have uncovered around \$285 billion in previously unreported GDP, 16.8 percent more than previously thought. The Chinese government's main statistical body, the National Bureau of Statistics, announced the widely expected GDP revisions on December 20, 2005. According to the new figures, services' share of GDP has risen from 31.9 percent to 40.7 percent, and shares of agriculture have dropped from 15.2 percent to 13.1 percent and of industry from 52.9 percent to 46.2 percent.

Table 1.6. A brief comparison of occupational classifications

United States (2001)	China (1999)
1 Management occupations	1 Managers of state and party agencies including state-owned enterprises and research institutes
2 Business and financial operations	2 Various professional and technical personnel
3 Computer and mathematical occupations	3 Administrative and officer clerks
4 Architecture and engineering	4 Retail, wholesale, and service personnel
5 Life, physical, and social science	5 Workers in farming, forestry, husbandry, fishery, and irrigation-related areas
6 Community and social services	6 Factory and transportation workers
7 Legal occupations	7 Military personnel
8 Education, training, and library	8 Miscellaneous
9 Arts, design, entertainment, sports, and media	
10 Healthcare practitioners and technical occupations	
11 Healthcare support	
12 Protective service	
13 Food preparation and serving-related occupations	
14 Building and grounds cleaning and maintenance	
15 Personal care and service	
16 Sales and related occupations	
17 Office and administrative support	
18 Farming, fishing, and forestry	
19 Construction and extraction	
20 Installation, maintenance, and repair	
21 Production occupations	
22 Transportation and material moving	
23 Military specific occupations	

Source: U.S. Department of Labor; China Ministry of Labor and Social Security.

Figure 1.6. Massive changes in the structure of output and employment



Sources: World Bank DDP database; World Bank 2003a; China Statistic Yearbook 2005.

Note: Figures for 2010–20 are projected based on authors' estimation.

Box 1.1. Promoting China's vocational education

Vocational education has been defined as the strategic focus of future education work, and a cross-ministerial joint vocational education working conference has been set up to tackle the issue.

Principle

The Chinese vocational education system should serve the needs of a market economy. A modern system with Chinese characteristics should have flexible models and autonomy for development, with close links to the labor market and enterprises.

Objectives

The main objective is to establish a sound operational mechanism and management system for vocational education. The development of vocational education should be "government taking leading role, depending on enterprises, involving industries, encouraging the participation of society, and promoting both the public and private sectors." The mechanism for management is "under the leadership of the State Council, with each level of government accountable while local government takes the major role and encourages the involvement of the whole society."

Specific goals include the following:

- By 2010 enrollment in secondary vocational education will reach around 8 million (now about 6 million), and enrollment in higher vocational education will account for more than half of entire higher education enrollment.
- In the next five years, graduates of secondary vocational programs will reach 25 million and tertiary programs 11 million.
- Vocational training with various modalities will be promoted, the number of trained labor force members will reach more than 100 million, and the quality of the labor force will be improved.
- The conditions of vocational education will be upgraded, overall quality of teachers will be strengthened, and the effectiveness and efficiency of vocational education will be enhanced.

Sources: China State Council 2005a; Wen 2005a; and MOE 2005b.

Financial constraints on government to address lifelong learning

Coping with the world's largest education and training market, China still faces serious financial shortages in various levels and types of education. Total education expenditure as a share of GDP was about 4.8 percent in 2001, and 5.4 percent in 2002 (including private spending), far below that in the developed countries, and even below that in many developing countries. China has about 22 percent of the world's students, but public spending is only about 4 percent of the world total. According to Ministry of Education statistics, in 2000 the financial appropriation for primary and high schools was not enough to pay the teaching staff salaries, with a shortage of RMB14.1 billion. The shortage of public funding for nearly 200 million primary and high school students was about RMB25.6 billion. For schools in rural areas, the situation is much more severe.

Some of the key issues follow: What part of the education and training system should the government finance and how? How can the private willingness to pay for education and training

be tapped most effectively? And how can equity be dealt with while relying more on private financing for education?

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