



THEORETICAL UNDERPINNINGS

A. THE RATIONALE FOR SKILLS DEVELOPMENT²

Skills development, and by extension skills formation systems, are important because of their contributions to individual and company incomes, and to national productivity. Enhanced skills enable individuals to be more productive and generate higher incomes. Workforce skills make enterprises more productive and profitable, and help national economies raise production and create wealth. “Vocational education and training are indispensable instruments for improving labor mobility, adaptability and productivity, thus contributing to enhancing firms’ competitiveness and redressing labor market imbalances (Caillods 1994, 241).”

1. Productivity

When people acquire skills they make themselves more productive, able to produce more output and income for a given amount of time and effort. This applies both to wage employment and self-employment. Moreover, when people acquire skills, they typically make those around them more productive. Since most work is teamwork, the productivity of one worker generally depends on the productivity of others. The more training a worker has—on or off the job, the more a worker can learn from others about doing a job effectively, and the more productively can workers interact in production, innovation, distribution, and sales (Booth and Snower 1996, 1; Ashton and Green 1996, 17).

² Some of this section is adapted from Johanson (2003).

2. Complementarities between Capital and Skills

Human capital is found to be a significant determinant of the amount of physical capital investment in an economy. "A higher level of human capital enables machinery and plant to be used more efficiently, raising the rate of return on investments (Ashton et al. 1999, 8)." "When labor and capital are complements, deficient investment in human capital...reduces the productivity of physical capital and thereby leads to deficient investment in physical capital and insufficient economic growth (Booth and Snower 1996, 6)."

The economic literature, as reviewed by O'Conner and Lunati (1999), suggests that a more educated labor force can raise the returns to investment in physical capital—i.e. that skills and capital are complementary. For example, Mincer notes the general tendency for skills demands to rise with development as a result of capital accumulation.³ In Barro, the stock of human capital affects growth principally through physical capital investment, with the two types of capital being complementary.⁴ The variation in investment rates in physical capital across countries is partly a function of absorptive capacity, which in turn depends on availability of human capital and other institutional factors. The rate of return on investment in physical capital would appear to be a positive function of the supply of human capital; where the latter is scarce, the former is low, and so too is the incentive to invest. If so, raising levels of educational attainment should, *ceteris paribus*, increase returns to physical capital and thereby boost investment

³ Mincer, J. 1995. Economic Development, Growth of Human Capital and Dynamics of the Wage Structure. *Journal of Economic Growth* I, March, pp. 29—48. Cited in David O'Connor and Maria Rosa Lunati, *Economic Opening and the Demand for Skills in Developing Countries: A Review of Theory and Evidence* (Paris: Organisation for Economic Co-operation and Development [OECD], Development Centre), p. 26.

⁴ Barro, R.J. 1991. Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics* CVI, pp. 363—394. Referenced in David O'Connor and Maria Rosa Lunati, *Economic Opening and the Demand for Skills in Developing Countries: A Review of Theory and Evidence* (Paris: OECD, Development Centre), p. 2.

rates. Benhabib and Spiegel found a significant positive association between the stock of human capital and productivity growth.⁵

Investment in physical capital, particularly capital equipment, is an important determinant of growth. Capital-skill complementarities largely reflect the skills required to master technologies in newly acquired capital equipment (O’Conner and Lunati 1999, 27). Specifically, more educated people are needed to operate higher-cost capital equipment incorporating sophisticated technology. In addition, use of expensive machinery means greater costs of machine down time, and hence a higher return to preventive maintenance technicians (O’Conner and Lunati 1999, 21). It can be argued that globalization raises capital flows from developed to developing countries. This means that, even without technology imports, capital output ratios in developing countries would rise and, given the complementarities between capital and skill, this would raise the relative demand for skilled labor (Mayer 2000, 25).

3. Technological Change

The acceleration of technical change in recent decades has been complemented by greater numbers of workers with higher skills. “Without a workforce that is continuously acquiring new skills, it would be difficult to reap most of the returns from technological progress (Booth and Snower 1996, 1).” When technologies are changing rapidly, necessitating a high rate of labor turnover across industries and occupations, adaptability is crucial to keeping labor and capital employed and maintaining competitiveness. When people acquire skills, they commonly also make themselves more adaptable (Booth and Snower 1996, 1). The advancement of knowledge and innovation, and the diffusion of new methods of production are aided by higher levels of education and training (Ashton et al. 1999, 8).

Technological change has shifted demand toward higher skills in the labor force (World Bank 2002, 78). New technologies are

⁵ Benhabib, J. and M. M. Spiegel. 1994. The Role of Human Capital in Economic Development: Evidence from Aggregate Cross Country Data. *Journal of Monetary Economics* 34, pp. 143—173. Referenced in David O’Connor and Maria Rosa Lunati, *Economic Opening and the Demand for Skills in Developing Countries: A Review of Theory and Evidence* (Paris: OECD, Development Centre), p. 27.

knowledge and skill intensive, and there is a need to train people to work with those technologies (IMF 2001, 3). As with capital-skill complementarity, complementarities also exist between technology and skills. The stock of human capital appears to be positively correlated with technological dynamism. The introduction of new technologies in lower income countries implies a reallocation of labor from low to high productivity activities, the latter being generally both more capital and skill intensive. This means that increased technology imports are likely to be accompanied by a rising ratio of capital to labor, and by demand for skilled labor (Mayer 2000, 23).

The mastery of a technology is like a skill that needs to be learned, normally at the organization or team level. Effective learning-by-doing depends on the level of education and skills possessed by the workforce, with interactive skills of particular importance in fostering teamwork. What accounts for rapid growth is the combination of education (and acquired skills) with technologies employed in organizations well designed to exploit them.⁶

Endogenous growth theory considers that the main reasons for poverty are gaps in the endowment of knowledge, and in the limited capability of developing countries to absorb new knowledge. The latter implies that development policy should concentrate on the interaction between technology and skills with a view to facilitating the reduction of the knowledge gap (Mayer 2000, 1).

Globalization can ignite a “virtuous circle” of technology upgrading and skill accumulation in technological late comers.

Technological improvements in backward countries are closely interrelated with their educational attainment: skill supply influences the amount and degree of sophistication of technology which can be adopted and used efficiently, while in turn the amount and sophistication of newly introduced technology impacts on the demand for skills (Mayer 2000, 2).

⁶ Nelson, R.R. 1994. What Has Been the Matter with Neo-Classical Growth Theory? In *The Economics of Growth and Technical Change: Technologies, Nations, Agents*, edited by Silverberg and Soete. Aldershot: Edward Elgar. Cited in David O'Connor and Maria Rosa Lunati, *Economic Opening and the Demand for Skills in Developing Countries: A Review of Theory and Evidence* (Paris: OECD, Development Centre), pp. 27—28.

One growing aspect of technology, information and communications technology (ICT), is perhaps the most important of any technological revolution in the past two centuries. The new technologies have led to the introduction of a wide range of new products, sharp declines in transaction costs, and vastly improved economic efficiency. Surveys on the introduction of new information technologies have found a strong association between the use of the new technologies and the rise of skill and educational requirements (ILO 1998a, 37—38; ILO 2000, para. 14).

Information exchange is an integral, but often overlooked, aspect of globalization. Knowledge about production methods, management techniques, export markets, and economic policies is available through ICT at very low cost. It represents a highly valuable resource for developing countries (IMF 2000, 5). But while Internet technology is not particularly expensive or capital intensive, it is human capital intensive.

4. Changes in Work Organization

Demand for and effective use of skills within an enterprise depends on the ways that work is organized (Booth and Snower 1996, 328). As noted by the ILO in “The Social Impact of Globalization,” the progressive adoption of new techniques of work organization is among the key factors behind globalization (ILO n.d., 15). Enterprises traditionally organized work according to a tight division of labor and narrowly specialized jobs under close control of supervisors. These traditional management systems are based on the assumption that breaking each task into its most elementary components was the most efficient way of organizing the production of standardized goods for a mass market. Traditional (Taylorist or Fordist) forms of work organization minimized the skills and training required of most employees for job performance. However, increased competition and the introduction of ICT have prompted many firms to make fundamental changes in their internal organization and work practices. These include changes in factory layout, flow of production, quality assurance, and use of inventory. There is no one model of such transformation, but collectively, reorganized firms are called “high performance enterprises”

(ILO 1998a, 41—43). High performance enterprises base their competitiveness not just on production cost, but also on incremental improvements in the quality of goods or services produced.

The changes in work practices and organization in high performance enterprises have profound implications for the skills required of employees because skill demands are derived from the way work is organized. Work teams in high performance enterprises typically incorporate devolution of decision making, self-management, multi-skilling, job rotation, and cross training.⁷ These methods confer greater flexibility on the organization, but can only work if employees possess technical skills in addition those normally required in a traditional organization (Ashton and Sung 2002, 83). In the high performance workplace, workers also must possess the cognitive and diagnostic skills necessary to perform a broad range of frequently changing tasks (Howell 2000, 6). Additionally, such workers must acquire social and problems-solving skills required for management of production. This generates the demand for learning to become a continuous process (Ashton and Sung 2002, 73). For example, the introduction of job rotation and multi-skilling increases the range of tasks and technical skills required by employees. The use of teamwork and self-managed teams means that workers must develop better communication and decision-making skills (Ashton and Sung 2002, 3).

Learning and training are necessary, but insufficient, conditions for improved performance and productivity at the enterprise level. For training and workplace learning to be effective, they must be “bundled” together with other organizational and work practices, such as regular performance appraisals, profit-related bonuses, information on business plans and performance targets, and regular feedback on performance (Ashton and Sung 2002, 12).

Evidence from studies suggests that considerable restructuring toward new forms of work organization has also taken place in developing countries (ILO 1998a, 44). Because new forms of work organization require greater responsibility and greater skills from the workforce, low skill levels in developing countries impede their

⁷ Multi-skilling involves upgrading jobs through the addition of new skills. It promotes greater workforce flexibility and productivity by creating a better-trained and more competent workforce.

introduction. Firms introducing new forms of work organization in developing countries, like their advanced country counterparts, typically invest heavily in further training of their workforce. The rise in investment in EBT has also been linked to the influence of the global standards of multinational corporations (ILO 1998a, 46).

All three factors—globalization, technological change, and changes in work organization—are closely linked. “The new information technology, by reducing the cost and increasing the speed of communication, has played a major role in globalizing production and financial markets; in turn, globalization, by intensifying competition, has spurred technological diffusion and the adoption of new forms of work organization (ILO 1998a, 33).”

5. Trade Openness, Competition, and Foreign Direct Investment

Globalization places a premium on skills. With globalization, skill resources, rather than the traditional resource base, determine the competitiveness of regions (Shankar and Shah 2001, 1). Openness causes a shift in the demand for skills through induced capital spending and technological change. Globalization raises capital flows, which in turn raise demand for skilled labor (Mayer 2000, 23). The stock of human capital serves to attract investment in physical capital, notably through foreign direct investment.⁸ Skill resources attract foreign direct investment. The existence of effective education and training systems in a country are likely to attract investment in manufacturing. Thus, a well organized education system and a more educated labor force can act to attract globalized financial capital.⁹ Alternately, lack of human capital may deter foreign investment in a country since physical capital tends to go to areas where human capital is abundant (O’Conner and Lunati 1999, 22).

⁸ Lucas, R. E. 1990. Why Doesn’t Capital Flow from Rich to Poor Countries? *AER Papers and Proceedings*, LXXX, p. 92—96. Cited in David O’Connor and Maria Rosa Lunati, *Economic Opening and the Demand for Skills in Developing Countries: A Review of Theory and Evidence* (Paris: OECD, Development Centre), p. 27.

⁹ See the case of the information technology software industry in India (ILO 1998a, 128—129).

Openness does seem to stimulate investment in physical capital. If human capital and physical capital are complements, the higher investment-to-GDP ratio in open economies would tend to increase their demand for skilled labor without a corresponding increase of supply. This could explain the tendency for relative wages of skilled workers to rise with economic openness. Given capital-skill and technology-skill complementarities, this suggests that the more open economies should experience a more rapid growth in demand for skilled workers than closed economies (O'Conner and Lunati 1999, 28—29).

Even with increased economic openness, not all lower-income countries have achieved rising technology imports or seen increased demand for skills. Nor will skills resources alone suffice to spur development. This is evident in the previously centrally-planned economies of the former Soviet Union, where high levels of labor force education were not associated with technological dynamism (O'Conner and Lunati 1999, 28). Skills development should be a coherent and integrated part of comprehensive economic, labor market, and social policies and programs that promote economic and employment growth (ILO 2000, para. 4). Also important are an effective legal and regulatory framework, low hidden transaction costs (e.g. corruption), and encouraging labor market conditions (O'Conner and Lunati 1999). Adoption of new ideas and technologies and increased demand for skills is a function of a number of domestic conditions, of which the stock of human capital is only one.

Further, growth in technology imports and skill levels of the domestic labor force must go hand in hand (Mayer 2000, 27). One without the other is insufficient.

The coordination of such efforts is critical because investment in human capital alone will lead to diminishing returns of skill accumulation while increased technology transfer alone is unlikely to be enduring and might have negative developmental effects from rising income inequality... The lesson from the East Asian experience was that rapid industrialization and skill accumulation were achieved by expansion of the education system in conjunction with a step-by-step upgrading of the skill intensity of economic activities (Mayer 2000, 27).

Experience of East Asia shows that the availability of skills cannot catalyze growth by itself, but that lack of skills can seriously constrain growth (ILO 1998a, 132).

Thus, as emphasized by Theodore Schultz, education and training enhance labor market flexibility to respond to structural changes in the economy.¹⁰ Countries with skills can adjust more effectively to the challenges of globalization because enterprises are more flexible and better able to absorb new technologies. The skill level and quality of the workforce will thus increasingly provide the cutting edge to successful competition in the global economy (ILO 1998a, 201, 203). In short:

...the twin forces of global integration and technical change have rendered education and training of paramount importance in the competitive process. The central issue for discussion in each and every industrialized country is therefore taken to be the manner in which the education and training system can be improved and skills raised (Ashton and Green 1996, 3).

B. THE CONSEQUENCES OF SKILLS DEFICITS

1. Effect of Skill Shortages on Productivity and Wages

First, skill shortages add to the cost of employing skilled workers since a firm must wait longer than usual to fill its vacancies. This may lead firms to substitute unskilled for skilled labor, thereby reducing productivity. Secondly, skill shortages improve the skilled workers' outside options, making it more difficult for firms to induce them to work hard... This problem could also give rise to inflation...(Booth and Snower 1996, 8, 147).

¹⁰ Schultz, T. W. 1963. *The Economic Value of Education*. New York: Columbia University Press. Referenced in David O'Connor and Maria Rosa Lunati, *Economic Opening and the Demand for Skills in Developing Countries: A Review of Theory and Evidence* (Paris: OECD, Development Centre), p. 26.

In general, integration with global markets raises the returns to education and skills (World Bank 2002, 19). Thus globalization has helped increase the relative returns to higher education because of the relatively higher demand for skills (Carnoy 1999, 37). A systematic analysis of the relationship between openness indicators and returns to education confirms that globalization does increase the wage gap between skilled and unskilled workers, at least in the short run. Based on data from more than three hundred studies on the returns to education in developing countries, an extra 1% of GDP in foreign direct investment raises the premium associated with an additional year of education by almost 0.8 percentage points. This is equivalent to increasing the wage gap between a college-educated person and a worker with primary education by roughly 10 percentage points (Rama 2003, 11). These effects will be offset over time by an increase in the supply of educated workers.

Thus, an increase in the demand for skilled workers as a result of trade openness, technological change, and changes in work organization can translate into greater income inequalities where skills are in short supply (ILO 1998a, 48—51).

Increased wage premiums for skills are not necessarily a bad thing. A rising wage differential provides greater incentives to individuals to invest in education and skills development, and thus supports the virtuous circle of technology and skill upgrading from the supply side of skill accumulation (Mayer 2000, 25).

2. Skills and Product Quality

A particularly interesting consequence of deficient training may lie in the composition of goods produced in the country. Specifically, a lack of skilled workers may adversely affect product quality.

When products of high quality require highly trained workers to produce them, economies can get stuck in a vicious cycle in which firms produce goods of low quality because there are few trained workers and workers acquire little training because few high-quality goods are produced... [This is the] 'low skill-bad job trap'... The predominant strategic choices made by employers in any country reflect the extent to which a skilled workforce is available (or easily developed). But they also affect the supply of skills by signaling to individuals the value of investment in vocational training and education (Booth and Snower 1996, 8—9).

3. Effect of Skills Gaps on Export Performance

Skill shortages can also affect export performance. The United Kingdom (UK) and Germany have comparative advantage in the same type of sophisticated manufactured goods. The UK's skill deficiencies (in craft and technician skills) tend to be evidenced as a lower volume of exports: the bigger the skills gap in any sector, the worse the UK's export performance relative to Germany's. "Reduced competitiveness would show up in the form of falling world market share, rising import penetration in the home market or increasing trade deficits with the more successful countries (Booth and Snower 1996, 199, 226)." The less skilled is a country's workforce, the greater the tendency to produce non-traded commodities (such as services), rather than traded ones (such as manufactured goods), because non-traded commodities are often more shielded from competition. This results in a relatively poor export performance (Booth and Snower 1996, 10).

C. THEORIES OF SKILLS FORMATION

1. Free Market, or Neoclassical Approach

Essentially, human capital theory regards education or training as investments with future material payoffs, analogous to investments in physical capital. Human capital theory links the stock of skills with the outputs of the productive system, whereby human capital input

shares equal status with physical capital inputs (Ashton and Green 1996, 14—15). The theory has its roots in Adam Smith:

When any expensive machine is erected, the extraordinary work to be performed by it ... will replace the capital laid out upon it, with at least the ordinary profits. A man educated at the expense of much labor and time to any of those employments, which require extraordinary dexterity and skill, may be compared to one of those expensive machines. The work, which he learns to perform, it must be expected, over and above the usual wages of common labor, will replace to him the whole expense of his education, with at least the ordinary profits of an equally valuable capital... The difference between the wages of skilled labor and those of common labor is founded upon this principle.¹¹

The theory was expanded by G. Becker (1964) in the individualistic framework of neoclassical economics. As with other commodities, the neoclassical approach to education and training sees the market as the most efficient framework for determining supply and demand (Ashton et al. 1999, 8). Individuals and firms respond to investment incentives, calculating costs and discounted future income benefits. An individual will undergo additional education or training when the likely future earnings sufficiently offset the present costs of training. If skills are scarce and wages are high, individuals have an incentive to undergo and finance their training. Similarly, an enterprise will invest in training workers to the extent that their future productivity with the firm will likely offset the costs.

One of Becker's main contributions was the distinction between general and firm-specific training. General training is that which is portable, i.e. can be carried to other employers for higher wages and benefits. Specific training is that which can be used only in the

¹¹ Smith, Adam. 1888. *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: Longman & Co. Quoted in David Ashton and Frances Green, *Education, Training and the Global Economy* (Cheltenham: Edward Elgar), p. 14. Ironically, at the time Smith was writing, the system of production did not require the majority of the workforce to be literate. The detailed in-plant division of labor, which he so eloquently advocated, rendered most jobs unskilled and cheap, while he viewed apprenticeships as outdated hindrances to trade (Ashton and Green 1996, 14).

enterprise offering the training. The division of the costs and benefits of training between firms and employees depends, given competitive labor markets and full information, on the degree to which general or job-specific skills are being produced. General training will be funded by employees since they reap the benefits. Firm-specific training will be financed by employers since they receive the benefits. Thus, in a free market environment, investment in training will take care of itself without government intervention. In fact, government training programs are unnecessary, even harmful, since they divert resources from consumption and investment in physical capital. If government intervenes in training, it should be to make markets function more efficiently—e.g. by eliminating price controls, promoting the flow of information, and encouraging competition (Booth and Snower 1996, 2, 4).

However, an important gap may develop between private returns and social returns. Insufficient investment in education or training nationwide may occur in a free market environment, and investment may be less than is socially optimal for a variety of reasons—usually called “market failures.”

- (i) Externalities may occur—i.e. the benefits of investment in training may be captured by parties other than the individual or training firm. First, most training within firms is general rather than specific, i.e. the skills can be used in at least some other firms. For example, most apprenticeship training in the German dual system is in fact general, and useable in an array of other companies (Acemoglu and Pishke 1998). The receiving employer obtains the benefits of these transferable skills. When firms “poach” trained workers from other companies, the firm that hires the trained worker reaps the benefits of training, in terms of increased productivity. This common phenomenon explains why firms may be reluctant to train workers. In short, externalities derived from transferable training lead to suboptimal levels of training.
- (ii) Labor market rigidities may reduce the incentives of workers to invest in their own training. A common example

is artificially compressed wage scales that provide little financial reason to upgrade one's skills.¹² Unions or minimum wage legislation may raise wages above their market level, thus distorting the returns to training. Another instance is when employers exhibit low demand for skilled labor (Booth and Snower 1996, 329—330). An additional case is when pay and status are not linked to the attainment of qualifications, as in Britain, so they provide little incentive for British employees to seek further training. In this case, the failure of young people to pursue training is rational; it does not provide sufficient benefits (Booth and Snower 1996, 315).

- (iii) Lack of information may be another cause of underinvestment in education or training. The absence of information about the benefits of education means that households do not wish to invest in the training of their members (Ashton et al. 1999, 11).
- (iv) Capital market failure. The lack of access to financing (e.g. for borrowing) to finance education and training will prevent individuals from investing in upgrading their skills.

In addition, weak training capacity of enterprises may mean that firms cannot perform their role.

For all these reasons, within the framework of neoclassical economics, there is a case for state intervention to regulate, stimulate, and subsidize the provision of vocational education and training (Ashton and Green 1996, 17).

¹² Some observers have attributed Sweden's poor economic growth during the 1980s and 1990s to the small wage differentials accorded educational/training qualifications in the 1970s and 1980s. They provided little incentive for individuals to invest in their own learning and training.

The single most important point to keep in mind is that it is naïve to suppose that wherever the market fails, the government can be relied upon to put it right... Only if the cost of market failure outweighs the cost of potential government failure can a case be made for public provision or regulation of training... There is no reason to expect the state always to be a more efficient provider of training than private sector firms are. Firms' skill requirements are highly idiosyncratic; government officials cannot be expected to know the millions of needed aptitudes, let alone provide them. The appropriate response to these problems may be state finance, without state provision, of training (Booth and Snower 1996, 10—11).

Thus, it is important to distinguish between government *financing* to correct market imperfections, and government *provision* of training. The only case in which government provision of training would be justified in the neoclassical approach would be as a second-best (and temporary) measure to compensate for inadequate training capacity in the private sector (Middleton et al. 1993, 105—118; Ziderman 2003, 39—45).

2. Human Capital Theory

Human capital theory received support in the late 1980s through a wave of endogenous or “new growth” theories that focus on increasing returns to investment, including human capital. Human capital is viewed as an endogenous factor that drives growth through multiple channels. In this theory, human capital causes externalities. The average level of human capital in a community impacts favorably on the productivity of a typical worker, in addition to his or her own endowment of human capital (Lucas 1988). Human capital is a key input for both the use and production of ideas. For developing countries, not on the technological frontier, large initial stocks of human capital enable them to adapt to new ideas readily and acquire technological capability. Endogenous growth theorists thus claim that “...the main engine of growth is the accumulation of human capital...and the main source of differences in living standards among nations is differences in human capital (Lucas 1993, 290, as referenced in ILO 1998a, 119).