

**Education and Development
A Note on Instrumental Effects**

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Education is valued for its own sake. It is properly regarded as a right, along with health, as an important part of becoming a complete person and a full member of society. And yet it also has a number of instrumental functions. The failure to educate has implications for many aspects of social and economic development. And a vast literature attests to the importance of education in enhancing productivity.¹ Because of the links to so many aspects of welfare, the connection between education and poverty reduction is substantial. (The literature on the direct connection between education and poverty reduction is not reviewed here.)

The literature comprehends macroeconomic contributions of education to economic growth: in East Asia's rapid growth period for example, significant shares of economic growth have been attributed to both primary and secondary education.² Education has also been found to be a significant factor in explaining state-level growth differentials in India.³ Sectoral studies show major contributions of education to agricultural productivity and manufacturing. In agriculture it is mainly – though not exclusively - primary education that has been important; but in manufacturing and the modern economy generally, secondary education - together with training - is the key to productivity growth, even in such "entry-level" activities as modern garment production and exports. To a considerable extent the ability of modern economies to respond to constant technological change in a globalising world market lies in the skill and adaptability of the work-force. It is not low-cost labour but low cost *skilled* labour that gives the edge in much of international competitiveness today.

Education has more widespread links with other aspects of development, and contributes more to other objectives than the fulfilment of those objectives does to it. Further, the educational system can serve as a "delivery" vehicle for other social sectors: it can teach about appropriate nutrition or health practices, for example. Research has concentrated on the relations of education with health; with fertility; and on the returns to educational expenditure. The effects on productivity are treated in a later section.

(a) Education and health

Relationships between education and health, of the educated *and* their children, are fairly well attested, even if the mechanisms are uncertain: via nutritional knowledge, via greater likelihood of demanding and using health services, via knowledge of disease transmission. It may be even more general, through socialisation and modernisation, and through increasing female status within the family, with consequences for family resource allocation to children and health.⁴

Not all studies show female education to be more important than male at the aggregate level; but the widespread tendency for mothers to be the

principal health-carers for children within the family is one of many considerations which emphasise the importance of female education. The path may be through income: educated mothers will earn more; and mothers' incomes in some settings may have an effect on children's health and nutrition several times that of fathers' incomes.⁵ In general educational expenditures and outcomes are found to be highly significantly related to health.

(b) Education and fertility

Again the relationship is well attested. The "mechanism" by which it works has three components: those which affect exposure to the likelihood of childbearing, most importantly age at marriage; those which affect desired family size; and those which affect the ability to regulate fertility. Female education commonly emerges as more significant than male. Many of the consequences of education, from changing aspirations and labour market effects, to better understanding of contraceptive use, play significant parts. Since improved child survival contributes to fertility decline, and fertility decline contributes to mothers' and children's health, there are many possible interactions and causal sequences.

Some studies in some regions show positive (statistical) effects of the early years of education on fertility, but probably because of intervening variables: e.g. improved health and ability to conceive, or "modernisation" and interference with traditional fertility-restraining practices such as post partum abstinence. These effects occur most commonly at lower levels of economic development, and when only a few years of primary education are completed. More commonly the association is monotonic - lesser fertility is associated with each additional year of education.⁶ Recently, however, considerable fertility decline has been observed amongst uneducated women,⁷ though even this may in part reflect diffusion effects from the educated to the uneducated.

(c) Returns to educational investment

Rates of return to education have been much studied at the micro level, and found to be sizeable and positive. There is some question whether these findings are the most persuasive part of the case for human development. A particular problem is that externalities at the societal level - health, fertility, productivity, institutional capacity - are rarely estimated, but may be at least as important as the micro effects which are measured. Rate of return calculations are useful to give confidence in the worthwhileness of particular educational investments, and for comparing their relative value. But as guides for investment choices in education, they need considerable supplementation.⁸

The main method of estimating returns to education is to look at "value added", typically comparing wages derived from age-earnings profiles for people of different schooling levels as measured by years of education. Even the private rate of return is not measured accurately: all that is usually

measured is that part of the return that is contributed by market wages. There are in fact numerous private benefits of education which are not thus captured, marketed and non-marketed, within and beyond the household; this is particularly the case with women's education.

Most of the "missing" elements in standard rate of return estimates would only add positively to the estimated rate. The exception is the "marginal versus average" issue, that is, the possibility that *current* age-earnings profiles exaggerate the *prospective* earnings of current school-goers. If this effect is small, then the standard estimate gives a lower bound to the true rate of return. However, we do not know that it *is* small. Altogether, one cannot be content with the commonly cited rate of return estimates based on market wages.

(i) Primary education

The generality of high returns in primary education should not distract attention from the widespread problems in developing countries of poor quality of education, poor facilities, high dropout rates, lack of family motivation to send children to school, or keep them there more than a few years (especially in rural areas). There is at the least a question of how to resolve the discrepancy between the high estimated returns to primary education, and its commonly poor quality in many developing countries. Broadly, however, despite all the problems, it is primary education which has been regarded as the key sector: it provides basic abilities, and is the entry to successive levels of education, as well as making important contributions to economic growth.⁹

(ii) Secondary and tertiary

Although the returns used to be found to be lower than for primary education, secondary and tertiary education are now seen to be of growing importance because of skill shortages and lack of administrative/management capacity. At least some studies question the primacy of primary education, or at any rate of pursuing universal primary education at the expense of more balanced educational development.¹⁰ There are equity problems, in particular with tertiary education, mainly to do with funding methods and the fact that it is the better-off who tend to take most advantage of opportunities at higher educational levels - but this is in part related to the fact that the children of better-off families in developing countries are more likely to complete and do well in lower levels of education.

The returns to tertiary education may be found to be poor for a number of reasons: it is often high-cost and inefficient; it is often of low quality; and it is often devoted to subjects which have relatively low market returns. The average return to tertiary education being low should not overshadow the fact that there may be very high returns for specific parts of it.

The old conventional wisdom that the highest returns are in primary education, followed by secondary, and then tertiary with the lowest is now a thing of the past - not because it is wrong about the relative priorities of the three levels of education, but because rate-of-return studies no longer show it to be right; and as a generalisation, it may be misleading for educational policy. Some of the rate of return analyses on which the conventional view was based were carried out with ancient or faulty data; and more and more assessments show higher returns to secondary than other education. A much wider range of factors than conventional rate of return estimates must be examined to determine educational priorities.

(iii) Vocational

Many studies find vocational training in schools to be an expensive way of doing the wrong thing. There is a preference for general education plus on-the-job or formal training by enterprises. But this leaves the problem to enterprises, which will not automatically provide solutions. Government-enterprise collaboration may be important in ensuring good results. Strictures on vocational education in schools do not apply to artisan and higher level training in purpose-designed institutions. There is also a role for vocational education in addressing the needs of children who are not suited for academic pursuits. The subject of training is treated at greater length below.

Industrial productivity and human resources

Much of the literature on trade and comparative advantage has been concerned with explaining the influence of human resources on trade patterns. Also a new literature relying on production theory and employing primary data collected from manufacturing enterprises in developing countries has provided a number of insights into the nature of static productivity differences among enterprises and their determinants.

A large literature exists on total factor productivity growth (TFPG) in developing countries. Among the other factors influencing TFPG, it is increasingly acknowledged that education of the labour force has made an important contribution. One study has drawn attention to the fact that the high level of education played a crucial role in the industrial transformation of East Asia.¹¹ The evidence is not confined to East Asia. A study of Brazil found that one additional year of average education per person of the labour force increases real output by approximately 20 per cent.¹² A recent study in the Heckscher-Ohlin tradition suggests India could multiply its exports fivefold and double the country's per capita income over two decades, if it reduced trade barriers and greatly increased its skill levels to take advantage of its potential for skill-intensive exports. Much of the article is based on comparisons with China, where average years of schooling in the labour force are considerably higher than in India.¹³

Agriculture and human development

A range of literature testifies to the importance of human development to agricultural productivity. A comparison of the Indian and Pakistan Punjab found most of the explanation of higher productivity in the former to lie in human and institutional factors.¹⁴ A survey for Asia showed over a wide range of situations that increased farmer education leads to substantially increased physical crop yields per hectare.¹⁵ The findings are particularly important because they often show results in physical terms when other inputs are held constant, and thus avoid many of the problems of estimating the benefits of education which arise in other fields. Farmers' education is mostly found to be beneficial when agriculture is modernising and new inputs are coming into use.¹⁶

The precise significance of particular skills derived from education is also explored in the literature;¹⁷ they include both literacy and numeracy skills which permit the farmer to take advantage of new inputs, introduce new farm management schemes, and benefit from agricultural extension - but also extend further, into attitudes towards and understanding of natural processes, causes of plant sickness and the like. In some studies a threshold of 4-7 years of education was found to be the minimum to have an effect. In India, secondary education or at least some education above upper primary was found to be strongly associated with the use of modern inputs.¹⁸ A further set of studies show the importance of health and nutrition to agricultural productivity. These include such micro-nutrients as iron deficiency and others, as well as general protein-calorie nutrition.¹⁹ The link may be from education to health to productivity.

An important finding in the literature is the major role played by research and extension in productivity. Over 1956-87, public research accounted for over 30 percent of total factor productivity (TFP) growth in South Asian agriculture, and extension for 25 percent of that growth. TFP growth in turn accounted for one third of total growth in crop output in the region. The estimated rate of return to investing in research was 63 percent and to extension 52 percent.²⁰ This is part of the reason for the importance of farmer education, without which much of the research cannot be translated into practice. But it also points to the necessity for a strong educational effort to generate researchers and extension workers - reinforcing the point made above, of the complementarities between different levels of education.

Services and human development

The idea that services are something that grow at a late stage of development is out of date. They are very large in many developing countries today - in Brazil and Pakistan, to take two very different economies, they already constitute 50 per cent of GDP according to World Bank indicators. They are important both as an output - a source of incomes and employment - and as an input, a complement to other aspects of development. The service sector does not of course consist of human resources alone; but the role of human resources in services is a very major one. Policies towards the service sector and its training and other

needs are thus very much a part of the modern concern with human development.

And beyond ...

The number of things education has been found to be connected with can be extended. A celebrated survey article including industrial countries lists an even wider range of externalities than those discussed above. They range from the ability to choose a marriage-partner successfully to the development of citizenship.²¹

¹ Much of it has been surveyed by the present author, with colleagues: see Cassen and Wignaraja (1997); Cassen and Mavrotas (1996). The current note is principally about education in developing countries; an equally vast literature attests to its productivity and other effects in industrial countries – see for example Prais (1995).

² See eg World Bank (1993).

³ Baddeley et al. (submitted for publication).

⁴ An excellent general survey is Hobcraft (1993). It attests to the link, but does not find clear evidence for the mechanism.

⁵ See Hoddinott and Haddad (1995); Thomas (1994).

⁶ See Cochrane (1986 and 1988). The more recent literature is extensive. An excellent example is Drèze and Murthi (2001).

⁷ Bhat (2000) suggests almost half of recent fertility decline in India is due to decline among the uneducated.

⁸ A critique of the conventional findings on rates of return is Bennell (1996).

⁹ World Bank (1993) found that primary education made larger contributions to growth than secondary even in some of the East Asian "Miracle" countries, though in some cases this may be due to under-investment in secondary education, as in Thailand.

¹⁰ E.g. Knight and Sabot, 1990.

¹¹ World Bank (1993).

¹² See Lau et al. (1993).

¹³ Wood and Calandrino (2000).

¹⁴ World Bank (1983).

¹⁵ Tilak (1993).

¹⁶ Jamison and Lau (1982).

¹⁷ Eg Cotlear (1989).

¹⁸ See studies cited in Tilak, *op cit.*, p. 192. For further detail on Pakistan, see Azhar (1991). Similar findings are found for Africa, eg by Durojaye and Olanloye (1992) for Nigeria, or Thirtle *et al.* (1993) for Zimbabwe (concentrating on research and extension).

¹⁹ Behrman (1993); Behrman and Deolalikar (1989); Strauss (1984).

²⁰ Rosegrant and Evenson (1992).

²¹ Haveman and Wolfe (1984).

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