



Chapter 3

Absorbing Knowledge

FOR INDIVIDUALS AND FOR COUNTRIES, education is the key to creating, adapting, and spreading knowledge. Basic education increases people's capacity to learn and to interpret information. But that is just the start. Higher education and technical training are also needed, to build a labor force that can keep up with a constant stream of technological advances, which compress product cycles and speed the depreciation of human capital. And outside the classroom, people's working and living environments are the setting for still more learning, well beyond the ages associated with formal education. Moreover, the benefits of education can spread well beyond the educated. The education of a mother pays off in better health care and better nutrition for her children. Educated farmers tend to adopt new technologies first, and in so doing provide those who follow with valuable, free information about how best to use the new methods.

Recognizing these benefits, many countries have made great strides in expanding enrollment at all levels, and a good number have made primary and even secondary education universal. But the gains in access to education have been unevenly distributed, with the poor seldom getting their fair share. Quality is too often deficient in some countries, to the point that they fail to endow their people with the basic skills—literacy, numeracy, and the capacity for analytical reasoning—required to compete in future labor markets. And delivery is still too inefficient, with too little tangible return for what is spent.

Public action can address these challenges. Government, already a pervasive presence as a provider and funder of education, exerts a powerful influence on students, parents, teachers, employers—in short, on all who contri-

bute to educational outcomes. And only public action can ensure equitable access, take spillover effects into account, and overcome market failures in the provision of education. One of the gravest of these failures is in the market for information *about* education. Too often, decisions about investments in education are made by persons such as illiterate parents or ill-informed bureaucrats far from rural schools, who have insufficient information either about what is needed or about what is available. Reforms that confront these problems in education can go some way toward increasing its equity and efficiency.

Education as a lifelong process

Because each level and type of education—basic, tertiary, practical—plays an important role in the absorption of knowledge, the process affects all ages.

Basic education—the scaffolding for lifelong learning

Basic education (which in most countries means primary and secondary education) develops a person's capability for learning, for interpreting information, and for adapting knowledge to local conditions. And through its effects on economic productivity and on other aspects of life such as health, it helps determine a person's well-being.

One of education's most powerful effects is on wages. Studies of labor markets in Ghana, Kenya, Pakistan, South Africa, and Tanzania show that part of the association between higher wages and basic schooling can be directly attributed to the knowledge learned in school. But part is also due to the fact that acquiring education signals a worker's capacity and motivation for learning. Studies from Côte d'Ivoire, urban Pakistan, and Peru report sig-

nificant “sheepskin” or credentialing effects: labor markets reward those who possess college degrees and other tangible signals of ability.

In performing this signaling role, the education system works to mitigate an important market imperfection. The information that schools provide about their alumni is valuable to employers, not only in selecting whom to hire but in matching workers with jobs that fit them best. And that is only the beginning:

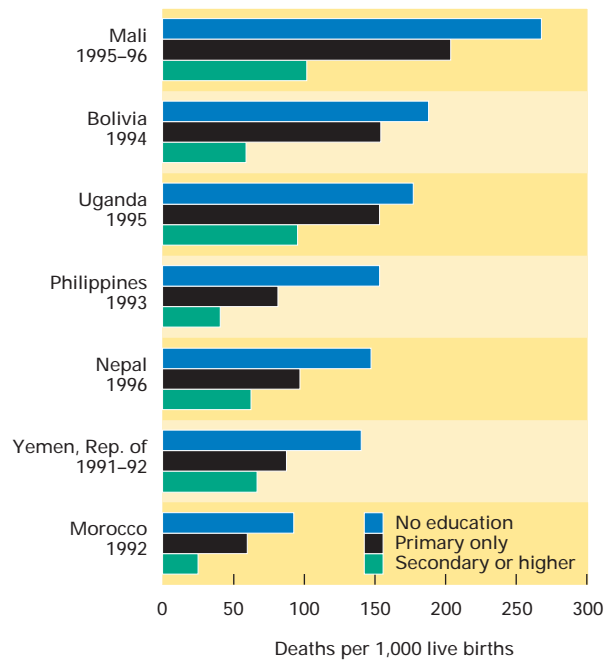
- **Schooling fosters agricultural innovation.** Farmers with more basic education are more productive and more likely to profit from new technology. The benefit is therefore greatest in areas of faster innovation, because schooling provides the fundamental cognitive skills that farmers need to respond to changing circumstances and learn from new experience. Farmers who adopted the new plant varieties developed in the green revolution realized lower profits at first, compared with other farmers planting traditional varieties. But as experience with the new seeds increased, profits rose for all farmers using them—and they rose more for the more educated.
- **Schooling enhances one’s ability to reallocate resources in response to economic change—to weather price fluctuations or the peaks and troughs of business cycles.** People with more schooling tend to be more venture-some and more willing to take the risks necessary to adapt quickly to a changing economic environment. In Slovenia, when employment and real wages fell in 1987–91, workers (especially women) with more education suffered a much smaller decline than those with less. Similar results hold in the wealthier industrial countries, such as the United States.
- **Schooling promotes the use of new technologies in the home, for health, nutrition, learning, and contraception.** In this the parents’ schooling, especially the mother’s, is critical. Child mortality declines and nutritional status rises with increased parental education, contributing greatly to children’s welfare and development (Figure 3.1). Part of the reason is education’s impact on earnings, but its effects go beyond that, since children in families with better-educated parents enjoy better health and nutrition at any given family income.

The influence of the mother’s education begins in the womb and continues through the preschool period and beyond. Over the past 30 years, measured IQs have risen globally by about 20 points. This rise, too rapid to have been genetic, suggests that new child-rearing practices have affected children’s innate ability and cognitive development, and thus improved educational outcomes (Box 3.1). This observation provides a compelling argument for governments to support early childhood programs that

Figure 3.1

Child mortality by educational attainment of the mother

Child mortality falls as mothers learn.



Note: Mortality data are for children under 5. Source: Macro International, various years.

raise lifelong learning potential, for example by ensuring that young children have access to adequate nutrition and health care, and by providing support and education to caregivers.

Schooling enables mothers to raise healthier children in four main ways:

- It imparts basic information about health and nutrition when such information is made part of the curriculum.
- It enables mothers to monitor their children’s health more accurately and to read written instructions, from pamphlets distributed by health workers to the labels on bottles of medicine. Mothers who are literate and numerate can also acquire and process basic health information from newspapers, magazines, and other media.
- It helps to overcome some inhibiting traditional practices: women who have attended school tend to be less attached to traditional remedies for children’s illnesses and thus more open to modern methods.
- It may also give mothers the self-confidence to use public health services when appropriate.

Box 3.1**Raising the potential for children to learn**

Cognitive development starts well before a child enters school. It is influenced by the mother's health and nutrition during pregnancy and lactation, and by the early intellectual stimulation and the health care and nutrition the child receives. Much is now known about these effects. For example, maternal iodine deficiency has been shown to lead to irreversible mental impairment in children.

In Guatemala, a long-term study showed that protein deficiency works its effects both through the pregnant mother and directly on the child. High-protein or high-energy supplements were given to a random sample of pregnant women and of children under 7. By adolescence, those children who had received the protein supplement performed better on tests of general knowledge, numeracy, reading, and vocabulary than those who had received the energy supplement. And the earlier and longer the supplement was administered, the greater the effect. In other studies in Ghana, Pakistan, and the Philippines, malnutrition was shown to delay the entry of children into school.

Studies of families participating in programs of enhanced cognitive stimulation showed that children from such families completed more schooling, or received higher earnings as adults, or both. In Turkey, high school students whose parents were provided special training in child development performed better academically. In the United States, children who participated in the High/Scope center-based preschool program reap the benefits into their adult years.

Schooling thus complements health services, particularly when more-educated individuals are better able to use the services properly or more likely to know that they are available. In some cases, improved education may reduce the need for health services, for example when schooling teaches better sanitation or makes families more receptive to healthier diets. Educated mothers may be better able to shield their children from diarrhea and infectious disease. Such an effect has been observed in the Philippines, where the provision of maternity clinics and increased numbers of doctors was found to reduce child mortality mainly for children of educated mothers. Schooling also contributes to health by helping parents cope with economic shocks, such as a sudden job loss or the death of a spouse, that adversely affect the health of children.

The spread of the AIDS epidemic provides another dramatic illustration of the value of education. Surveys show that more-educated men and women are more likely to be aware of the protective effects of condoms. Moreover, among those with casual partners, the probability of condom use increases with years of schooling. In a Tanzanian survey, 20 percent of women with four to seven

years of schooling, but only 6 percent of uneducated women, said they used a condom during sex with a casual partner.

These findings mean that the basic skills learned in primary school go a long way toward improving the lives of poor children and adults. These skills equip parents with the ability to take advantage of public health services when they are available. And they allow parents to cope better in the absence of these services: educated parents know what needs to be done and will improvise as best they can.

These findings also imply that basic health knowledge should be taught in primary school, because thereafter the rate at which girls begin to drop out accelerates sharply. Unfortunately, significant numbers of girls in poor countries never attend school and will someday join the ranks of illiterate mothers. So beyond the gains to public health from expanding enrollment, it is also worth reaching out, through adult education or mass media campaigns, to women who have never attended school. Even basic education can be a lifelong process.

Tertiary education—building knowledge for an information-based society

Basic education is thus critical for enhancing people's capabilities to harness knowledge, particularly in the poorest countries. But it should not monopolize a nation's attention as it becomes a player in global markets. For one thing, the tremendous enrollment gains in basic education in the past decade suggest that, in many countries, improvements in areas beyond basic education offer higher marginal returns. For another, new, information-based technologies are more demanding in skills for diffusing, interpreting, and applying knowledge. Besides teaching new and better skills, tertiary education and technical training produce people who can monitor technological trends, assess their relevance to the country's prospects, and help develop an appropriate national technological strategy. And countries at or near the technological frontier need strong tertiary education and research institutions to compete in the creation of new knowledge.

The appropriate strategy for most developing countries, as Chapter 2 argued, is to acquire foreign technology as cheaply and use it as effectively as they can, adapting it to local conditions. New knowledge in the form of scientific discoveries and inventions requires abundant financial resources, sophisticated human capabilities, and the business acumen to stay ahead of competitors—factors generally beyond the reach of developing countries. Being a technological "follower" did not hurt the East Asian economies, which began their spectacular rise by being very good at adapting foreign technology. But even a follower country needs a labor force with a relatively high level of technical education, especially when technologies are

changing rapidly. A study of about a thousand inventors in India illustrates this point: almost 90 percent had a university degree, more than half had some graduate training, and nearly 30 percent had earned their doctorates.

There is also some evidence that the type of tertiary education provided matters for economic growth. The proportion of students majoring in mathematics, science, and engineering (but not the proportion majoring in pre-law) has been found to be positively associated with subsequent growth rates, suggesting higher returns to education investments in these fields than in others (Box 3.2). The content of education thus appears important for countries seeking to develop new technologies suitable for local conditions.

The production of new knowledge, as well as its adaptation to the setting of a particular country, is generally associated with higher-level teaching and research. In industrial countries university research accounts for a large share of domestic R&D. The same is true in most developing countries, but on a smaller scale. The best-known example is that of agricultural colleges and universities, where the bulk of scientists are engaged in agricultural R&D work. They have made important contributions in such countries as India, Malaysia, and the Philippines.

Of course, high and fast-growing university enrollments do not guarantee rapid growth. As Box 3.2 suggests, *what* students are taught may be at least as important as the number of years they spend in school. And without certain essential complementary inputs, even the best education system cannot lead to growth: some countries have found themselves with unemployed engineers because they failed to provide the other necessary ingredients to encourage private sector development to make use of these valuable skills. These ingredients include a healthy investment climate, a stable macroeconomy, and fewer state monopolies. What is clear, however, is that the aggressive investment in tertiary education that many of the East Asian economies made enabled them to sustain the new industries that provided the basis of their later growth. Those industries generated strong demand for engineers and other highly skilled workers. Thanks to these education investments, these economies were able to sustain their strategy of technology adoption in a world of constantly shifting knowledge (Box 3.3).

Universities thus serve a multiplicity of roles—not only enhancing the skills of future workers but also producing new knowledge and adapting knowledge produced elsewhere. The fact that universities throughout the world package these activities—teaching and research—suggests that there are strong complementarities between them. But this very multiplicity of activities can also give rise to conflicts of interest between those who supply and those who demand universities’ output. Competition among

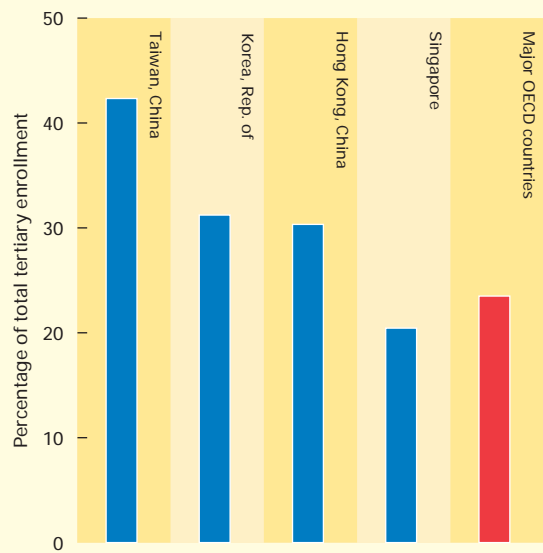
Box 3.2

Mathematics, science, and engineering studies may spur growth

A recent study investigated the relationship between the proportions of college students majoring in various disciplines in 1970 and subsequent real growth in GDP per capita. The study found a significant positive association between the proportion of engineering majors and later growth—but none between the proportion of prelaw students and growth. And for the 55 countries with college enrollments of at least 10,000 in 1970, the proportion of college students in engineering was significantly and positively associated with subsequent levels of physical capital investment and with primary schooling. Although these studies fall short of establishing a causal effect of science and engineering education on growth, they confirm that countries with a more technically skilled labor force do have faster growth.

This emphasis by some countries on higher scientific and technical studies has enhanced their capacity to import sophisticated technologies from the richer industrial countries—and helped maintain high rates of economic growth over a long period. When current tertiary enrollment is broken down by field, the East Asian economies show higher ratios in technical fields than the major industrial countries (see figure).

Tertiary enrollment in technical fields in selected economies

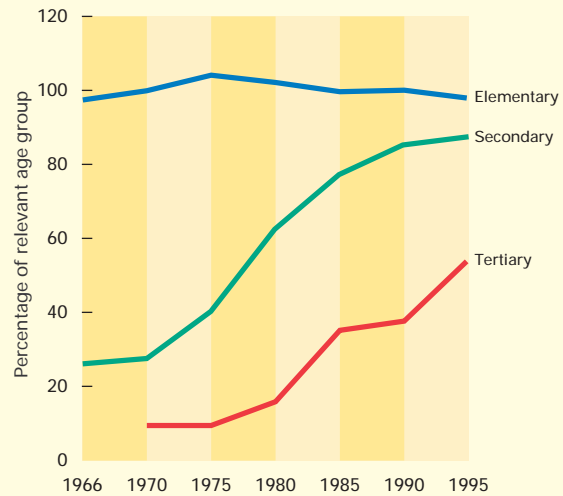


Note: Data are enrollments in mathematics, computer science, and engineering for various years from 1990 to 1994. Source: Lall, background paper (b).

Box 3.3**Korea's heavy investment in human capital**

Most analysts agree that education and training were critical in sustaining Korea's economic growth over a remarkably long period. By 1960 Korea had achieved universal primary education, which provided the basis for a well-educated labor force that fueled the economy's growth as it industrialized.

Korea also invested heavily beyond the primary grades. By 1995 the gross enrollment rate for secondary education was 90 percent, and that for tertiary education was almost 55 percent, which compares favorably with most OECD countries. The dramatic rise in tertiary enrollment took place immediately after the economy took off in the 1970s (see figure). Many observers have concluded that the rapid growth in tertiary enrollment, rather than being the impetus to economic growth, was financed by the initial growth spurt, and thereafter played an important role in sustaining it. Also interesting is the fact that Korea's private sector has been responsible for much of the rapid increase in higher education. Enrollment at private colleges and universities reached 82 percent of total tertiary enrollment in 1995. In that year private spending on tertiary education, at 6 percent of GDP, outstripped the government's 5 percent share.

School enrollment rates by educational level in Korea

Note: Tertiary data for 1966–70 are not available. Source: OECD 1996a.

universities should ensure that curricula will be more attuned to the perceived demand of students and adapt faster to changing technologies. For instance, having long ago added computer science as a field of study, universities in the industrial countries have now integrated the use of computers throughout the curriculum. Students from developing countries who seek further training overseas will be at a severe disadvantage if the quality of education they receive at home falls far short of what they later encounter abroad.

To enhance the likelihood that their curricula and their research will remain relevant, many schools and universities are forging closer partnerships with industry. For example, universities in the United Kingdom have been building bridges to industry through curricula that include work-based learning components. Most Canadian universities now have an industrial liaison or technology transfer office. In fact, such partnerships enjoy widespread support within academia. In the United States, the OECD country with the largest share of university R&D spending in total R&D, a recent study shows that academics support research that directly leads to technological innovation, and that they are favorably disposed to consulting for private industry.

Because the returns to creating and adapting new knowledge are difficult for any individual (or any school, firm, or research institute) to appropriate, a spillover effect—an ex-

ternality—intrudes: there will be underinvestment not only in research itself (even research aimed at adaptation rather than creation) but in the key factor in the production of research, namely, researchers. That is one reason why universities and governments generally subsidize graduate students acquiring research degrees rather than those earning professional degrees—the latter already pay off handsomely to the degreeholder. A further reason for public support of advanced training, especially in research fields, is its high cost: with imperfect capital markets, prospective students may not be able to finance their education, even where they are able to appropriate the full returns (see “Helping poor people pay for education” below). The funding constraint is especially binding for children from poor families. Providing subsidies in these cases may increase not only economic efficiency and growth, by ensuring that talented students are better able to realize their potential, but equity as well. Of course, resource limitations imply that any such expenditures or subsidies should be carefully targeted to those areas where the externalities are greatest, or where capital market imperfections are most confining.

Vocational training and learning-by-doing

Productive learning does not just occur in the classroom—nor does it end with formal schooling. People continue to learn at work and through formal and informal job training. Learning-by-doing improves workers' performance.

And because experience provides opportunities for discovery, it increases the general stock of knowledge. Similarly, learning can lower the unit costs of production as workers discover better ways to use new technology, to organize production, or to monitor product quality. The observation that wages and productivity rise with experience in the initial stages of many jobs is consistent with such on-the-job learning. Again the green revolution provides telling evidence: farmers with basic schooling had little initial advantage in using the new seeds over farmers with none, but the more-educated farmers came to enjoy a substantial advantage as they gained more experience. This again points to the importance of learning-by-doing—and of basic schooling as its foundation.

Korea's path to technological mastery shows how the application of new knowledge can actually add to that knowledge. It has been argued that Korea's rapid industrial growth in the past two decades, by compressing the intervals between the construction of successive plants, permitted rapid technological learning in many industries. The first plants—which were often small relative to the market or to the size that would exhaust scale economies—were frequently built on a turnkey basis. Thus learning first came about through Korean workers operating plants built by others. But in the building of subsequent plants, local engineers and technicians assumed larger roles in design and implementation, and the newer plants were built to scales of production much closer to those achieved by the global market leaders. This developed Korean workers' capability to innovate. And it suggests that when technology is changing rapidly, the shop floor may be the best place to learn.

But learning-by-doing is not always enough. In some cases, formal training, whether undertaken inside or outside the firm, is far more important than work experience for acquiring technical knowledge and skills. The two may be complementary, of course: learning-by-doing may be more effective when preceded by appropriate preemployment training. Whatever the reason, larger firms around the world have found it useful (smaller firms less so) to provide workers with some formal training, perhaps because they have lower labor turnover rates and can thus realize more of the returns to training.

Why should countries—and especially governments—worry about education?

In the past three decades, many countries have made enormous strides in expanding enrollment at all levels. Yet despite these gains, new challenges have emerged as countries have had to absorb ever-expanding amounts of knowledge and information. Meanwhile other, older challenges persist, and indeed must often be given priority because they are so fundamental.

First, the gains in access to education have been unevenly distributed. Many countries still lag far behind in the pursuit of universal literacy, especially for girls and women (Figure 3.2).

Second, in many countries the poor get much less than their fair share of government spending on education. In Ghana the richest 20 percent of households appropriate 45 percent of subsidies to tertiary education, while the poorest fifth get only 6 percent. The distribution in Malawi is even more skewed: there the corresponding figures are 59 percent and 1 percent (Figure 3.3).

Third, education in many countries remains of poor or mediocre quality, particularly when it comes to the basic skills on which countries will depend to meet the needs of tomorrow's labor markets. One can infer this from well-known deficiencies in inputs—absentee teachers, an emphasis on rote learning, outdated curricula, and shortages of textbooks and other materials. But quality shortfalls are also showing up in output indicators such as the results of internationally comparable tests: in the Third International Mathematics and Science Study, for example, students in some developing countries did poorly (Figure 3.4). These results also show that resources alone do not determine performance: even some rich countries (notably the United States) did not fare as well as some East Asian high achievers (such as Singapore and Korea). One must be careful not to read too much into these results, since they fail to account for differences within countries (inner-city schools versus well-endowed suburban schools, for example) and test only a narrow set of skills, but they have been influential in drawing attention to real problems.

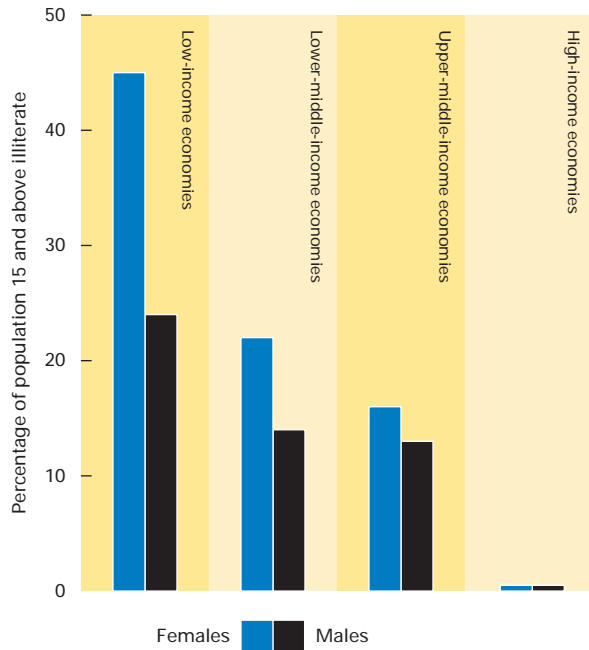
Fourth, schools at all levels still provide their services too inefficiently, especially when compared with institutions that must compete to survive. Studies show that not only are unit costs in public secondary schools higher than in their private counterparts, but the private school students score higher on standardized tests (Figure 3.5). Here, too, however, meaningful comparisons are often difficult, because the effects are confounded by background variables, some of which may be unobserved. Although the studies in question attempted to control for these variables statistically, some ambiguity remains about the magnitude of the difference in efficiency.

Reforming public policy is key to addressing these challenges. In the majority of countries more than 90 percent of primary and secondary students attend public rather than private school (although the variance is much higher at the secondary level; Figure 3.6). The government's extensive involvement in education is no accident. We have already explored two reasons for government action at the tertiary level: the presence of externalities and capital market imperfections (and their distributional

Figure 3.2

Illiteracy by gender and level of income

Large gaps in literacy persist both within and across countries.



Note: Data are for 1995. Source: World Bank 1998d.

consequences). Yet these market failures arise not only there but throughout the educational process.

Passing knowledge on—the spillover benefits of education

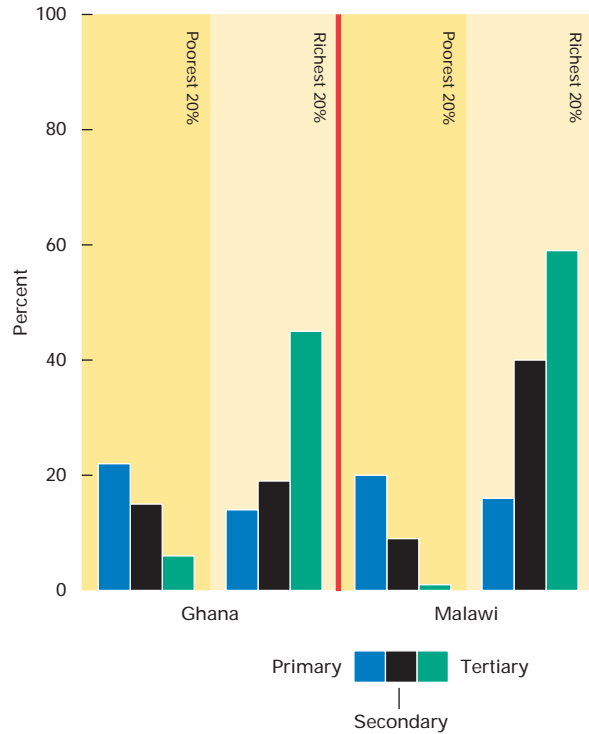
The education of one individual often increases the learning of others in the family and the community. Best known is the intergenerational impact: the most reliable predictor of children’s educational attainment is the level of education of their parents. Children of more-educated parents get more education than do children from households with similar incomes but less education, and they generally do better on tests. In some circumstances, as with primary schooling in Lahore, Pakistan, the education of the mother has a larger influence than that of the father, perhaps because of the mother’s greater role in the home.

Even the education of other community members may affect how and what a person learns. Peer effects in a classroom can benefit all the children present by setting positive feedback cycles in motion, which enhance learning in the long run. But it is in the interest of those generating the positive feedbacks to set themselves apart, to try to internalize these externalities. The result can be socio-economic stratification, which indeed has become a prime

Figure 3.3

Shares of public educational subsidies received by rich and poor households in two African countries

The benefits of public education spending are often skewed toward the rich.



Note: Data are for 1992 for Ghana and 1994 for Malawi. Source: Castro-Leal and others 1997.

concern in many private elementary and secondary education systems (although some parochial schools have been quite effective in promoting both racial and socioeconomic integration).

Education also exhibits externalities in production. Recall from the discussion of the green revolution that farmers with more schooling were the first adopters of high-yielding varieties—and that their neighbors, learning from them, adopted new seeds more quickly than they would have otherwise. Such spillovers could lead to underinvestment both in schooling and in experimentation on the farm. In a study of villages in India, the proportion of educated households was significantly less than that which would best promote the adoption of new technology. The reason is straightforward: households do not base their educational choices on the uncompensated gains they provide to others when they explore new technologies.

Ultimately this underinvestment may lead to social and economic problems, the costs of which are likely to be borne at least in part by the government. For instance, one study in the United States showed that, on any given day in 1992, almost one-quarter of male dropouts between 18 and 34—but only 4 percent of high school graduates in that age group—were either in prison, on probation, or on parole. Here as always, interpreting causality is risky, but their lack of education surely limited the opportunities for these dropouts within the legal job market and encouraged them to turn to other ways of making a living. Conversely, higher levels of education have been found to lead to higher incomes, with government reaping part of the benefits in the form of higher tax payments.

These spillovers are an important reason for government to encourage education, because individuals may not take them into account in deciding whether to invest in education for themselves or for their children. In some cases they simply may not know about these external ef-

fects. In others, they know but lack the incentive to consider them.

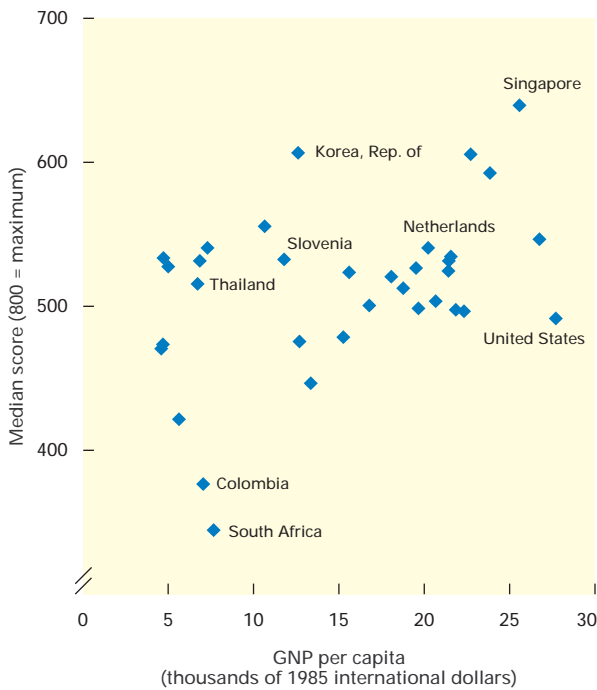
Information issues within education

In all markets for knowledge-based services, consumers have a difficult time judging quality—not just before receiving the service, but even after. For their part, the providers of services may be tempted to exploit consumers' ignorance. Doctors can order excessive but (to them) remunerative tests. Mechanics can recommend unnecessary but (to them) remunerative repairs. Brokers can tout unprofitable but (to them) remunerative trades. Mechanisms arise to temper these perverse tendencies: competition among providers, government regulation of standards, professional self-policing, legal recourse against malprac-

Figure 3.4

GNP per capita and mathematics test scores

Educational quality bears no obvious relationship to income.

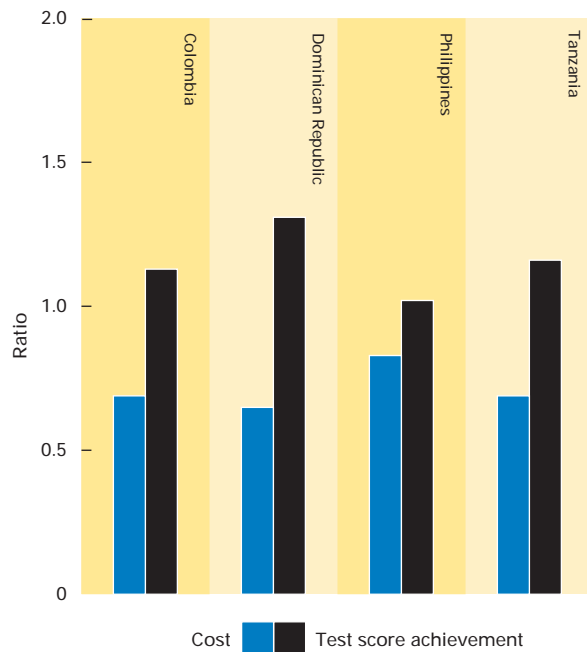


Note: Data are for 32 countries worldwide for 1994–95. Test scores are from the Third International Mathematics and Science Study. Source: Beanton and others 1996, World Bank 1998d.

Figure 3.5

Ratios of private to public education costs and test score achievement in four countries

Even for students of similar background, private schools often deliver better education at lower cost.

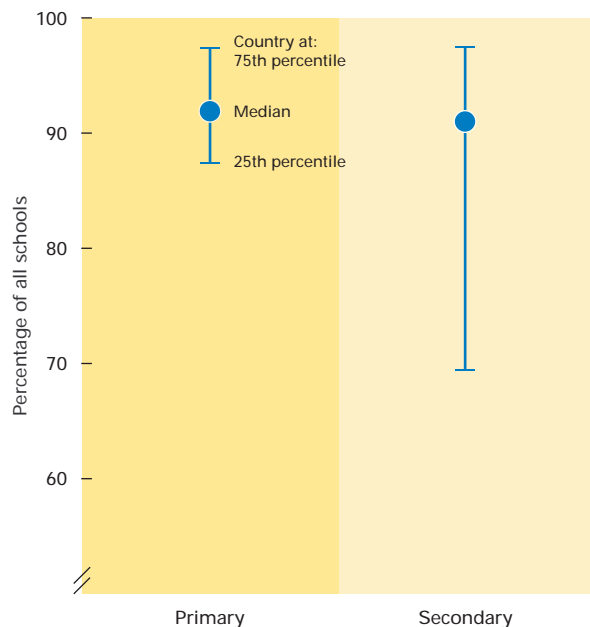


Note: Data are for 1981 (Colombia), 1982–83 (Dominican Republic), 1983 (the Philippines), and 1981 (Tanzania). Scores are from tests of mathematics and language skills, except in the Philippines (language skills only). Achievement is adjusted for differences in the background characteristics (such as urban or rural residence, gender, number of siblings, and parents' education, income, and occupation) of children from public and private schools. Source: Jimenez, Lockheed, and Paqueo 1991.

Figure 3.6

Public sector shares of primary and secondary enrollments

Public education dominates the field in most countries.



Note: Data are for 1995 and cover 113 countries (primary) and 100 countries (secondary) worldwide. Secondary enrollment is that in general secondary schools only. Source: UNESCO 1998.

tice. All share the same objective: to make providers accountable for outcomes and costs while preserving professional autonomy.

Markets for education and training face the same information problems on at least three levels: factual content (are teachers teaching the Pythagorean theorem correctly?), the appropriateness of that content (do students need to know the Pythagorean theorem?), and the pedagogical approach (are teachers teaching the Pythagorean theorem so that students can understand and apply it?). But markets for education are even more complex than those for medical services or car repairs, because so many actors jointly determine the outcome. Providers include not only teachers but also policymakers, central administrators and inspectors, their provincial or municipal counterparts, school administrators, and nonteaching staff. Just as important is the influence of parents and the local environment on the student, not to mention the student's own aptitude.

These decisionmakers possess widely varying amounts of information about the educational process—and about each other. For example, it is typically parents who make

the decisions about education (especially primary and secondary education) for their children—not the children themselves. But parents, however well intentioned, may be uninformed, or insufficiently informed, about the relative benefits of competing educational offerings—or about the value of education altogether. Conflicts of interest can also arise: parents may be eager to use their children's labor and may not fully appreciate the effects that foregoing education will have on their children's future. Government's role is to make up for these limits in the private market for education, and in the process to level the playing field for information.

Policy and information

Governments are, and should be, involved in education. But experience shows that designing the right policies, and then implementing them, is far from easy. Cross-country studies have found public spending on education to be unrelated to growth—worse yet, it is unrelated to educational outcomes, or at least such immediately measurable ones as scores on standardized mathematics and science tests (Figure 3.7). Care must be taken in interpreting these results, since higher test scores are not the ultimate purpose of education spending. But they are one of many indicators that show that it is the quality of spending, not the amount, that matters. Indeed, when funds are spent on inputs or programs that work, they can significantly improve outcomes. In Ghana, for example, spending for blackboards and classroom repairs has been shown to increase test scores—and raise wages by 20 percent.

Over the past decade, several editions of *World Development Report* have discussed the efficiency and equity issues bedeviling education. Too often, governments have invested in poor quality, done so at high cost, and failed to serve the needs of the poor or of other groups, such as girls, whose returns to education are potentially high. So there is much more to policy reform than simply spending more from the public purse. Governments have to make tradeoffs as they distribute limited resources across the array of educational vehicles associated with lifetime learning: preschool programs, formal schooling (basic and higher), formal training programs, on-the-job training, information dissemination programs, and informal education. The most effective public actions are those that focus directly on the source of the market failure or the distributional concern. For example, subsidies are warranted if individuals do not consider the positive effects their basic schooling may have on others. University research needs to be subsidized as well, since those undertaking it can seldom appropriate the gains.

The links between such market failures and policy reforms raise some general issues that lie beyond the scope of this Report—but are treated more comprehensively in such

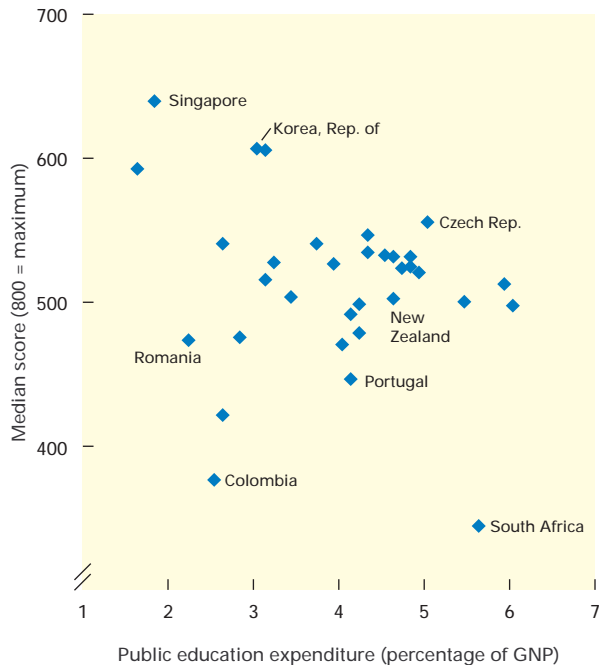
documents as the World Bank’s recent strategy papers on education. Here the focus is on showing how addressing the market failures associated with information problems in education can go some way toward resolving the issues discussed above. Policy can address these market failures by:

- Empowering those with the most information—users and local providers—by decentralizing
- Making information about educational options more accessible, so that users and providers can make informed choices
- Helping poor people pay for their education—particularly tertiary education—so as to offset information failures in capital markets, and
- Using new knowledge to update curricula and new technologies, to improve the quality of education and broaden access.

Figure 3.7

Public education spending and mathematics test scores

Generous state spending does not guarantee quality education.



Note: Data are for 34 countries worldwide for 1994–95. Expenditure is that for preschool, primary, and secondary education. Since the share of education spending in GNP does not usually change quickly, these data are representative of spending over a longer period. Test scores are from the Third International Mathematics and Science Study. Source: Beanton and others 1996, UNESCO 1998.

Empowering informed stakeholders

Government provision of education creates three sets of stakeholders: citizens, educators, and governments themselves. Together these stakeholders must create a system that ensures that private and public money for education is well spent, while maintaining for educators the professional autonomy necessary for excellence. But to ensure accountability and efficiency, citizens—both as taxpayers and as consumers of education—must have adequate information to judge whether particular institutions are providing formal education efficiently.

Centralized education systems, despite their many remarkable successes, are beset by some basic information and accountability problems, leading to inefficiency and high costs. Quality is a continuing source of concern. It is difficult to discern the quality of education, because adequate assessments are generally lacking. But some assessments have been made, and many of them find that students have not mastered the skills the curriculum meant to impart. In some school systems—primary schools in Ghana and Kenya, for example—testing after several years of instruction reveals a significant percentage of children with scores no better than random guessing.

Perceptions of educational quality differ among the various stakeholders. A recent survey in Vietnam asked parents, teachers, and local commune leaders about school quality. Their assessments were correlated, but still quite different one from the other (Box 3.4).

To address the problems of information imbalance and limited accountability due to overcentralization, many systems are moving from a “top-down” to a “client-driven” model. These changes take several forms: decentralizing administration, increasing school autonomy, moving to demand-side financing (where the family rather than the government pays), increasing the information available about specific educational institutions, and relying on a mix of private, nongovernmental, and public providers. Although each of these reforms has its pluses and minuses, all seek to address perceived weaknesses in traditional systems.

Administrative decentralization means moving responsibilities to smaller jurisdictional units: from the nation to the province, from province to municipality, from municipality to the schools themselves and their clients. Decentralization can help countries and communities deal with information problems relating to differences in local preferences and conditions. It can also help improve the coordination and enforcement of education standards, because local jurisdictions are assumed to have the informational advantage in identifying cheaper, more appropriate ways of providing services to fit local preferences. They can also better monitor the performance of providers. Above all, decentralization can strengthen the account-

Box 3.4**Grading the teachers: Varying perceptions of school quality in Vietnam**

A stratified random survey of 1,890 Vietnamese households, when evaluated alongside the results of linked school and community surveys (which interviewed school headmasters and commune leaders), indicates how sharply perceptions can differ about school quality and what would most improve it. Among the findings:

- At the primary and lower secondary levels, householders' evaluations tended to be lower than those of the headmasters. A systematic tendency was observed among those on the supply side to give more positive judgments than those on the demand side.
- The headmasters' evaluations were much more in line with independently observed school characteristics than were the householders'. It may be that school heads are better informed than households about school inputs, or rather that households are concerned more with outcomes than with inputs.

In the judgment of the commune leaders, the two changes that would most improve the schools are better physical facilities (mentioned by 38 percent) and improved teacher training (34 percent), with more teachers (12 percent) and higher pay for teachers (10 percent) far behind. This differed from the perspective of the headmasters, who mentioned better teacher pay more than twice as often (20 to 23 percent).

These patterns are consistent with the possibility that headmasters face a conflict of interest between improving school quality and increasing staff compensation. This may lead them, but not other stakeholders, to give greater weight to increasing staff pay.

ability of local institutions, thus improving quality and cost-effectiveness.

But decentralization alone cannot solve all problems. Local governments and communities may lack the capacity to produce and manage high-quality education services. The information imbalance can work both ways: the central government may not know what to do; the local government may not know how to do it. That is why assessing local capacity is so important. The allocation of responsibilities between central and local government must be guided not just by the latter's informational advantage, but also by local capacity to enhance the quality and efficient delivery of services.

Sometimes, however, the rhetoric of decentralization is used as a pretext to shift responsibility to lower levels of government without also transferring the necessary resources or revenue bases. This only widens regional in-

equality. But in other cases decentralization is genuinely viewed as an investment in the nation's future, which is worth enduring some short-run inefficiencies and inequalities provided that, in the long run, a culture of participation and vigilance emerges at the community level, and quality improves.

Indeed, one of the lessons of past decentralizations is that going partway—from the central to the provincial or even the municipal level, for example—may not lead to as many gains as expected. The biggest potential gains come from promoting greater control of decisionmaking at the school level, typically through greater involvement of parents and the broader community in school management. In Nicaragua, an ambitious reform of public schools gives principals, teachers, and parents greater autonomy in managing their schools—the new regime places many decisions about staffing, supervision, administration, and pedagogy in the hands of a school council composed of local stakeholders. Not all schools have been transformed by this reform. But evaluations indicate that when local stakeholders rather than the central government do make more decisions affecting the school, and teachers feel they are better able to influence school operations, students perform better.

In El Salvador, the government that came to power in the wake of that country's devastating civil war formalized, improved, and expanded the community-managed schools that had arisen after the public system broke down. Initial evaluations show that even the poorest communities can set up and manage such schools—and improve quality in the process. One reason is that parents monitor teachers vigorously: students lose only about half as many days to teacher absenteeism as in conventional schools.

Subsidizing students or their families, rather than providers, can also improve the availability of information and increase accountability by bolstering the voice of consumers. Subsidies can be routed either to providers through per-student grants in systems where students choose which schools to attend, or to consumers directly through scholarships or vouchers. The results of voucher schemes remain controversial, however.

Providing information for better choice

For programs to be effective and suppliers to be held accountable, clients must have good information on which to base decisions. In addition to efficiency gains, there are likely to be distributional gains, because poorer families are likely to be the least informed under the status quo. Unsubsidized private providers are not likely to make sufficient information available about the effectiveness of educational alternatives.

Consider the provision of adequate health information. One form of government action, known as informa-

tion, education, and communication (IEC), encompasses such activities as billboard advertising, pamphleting, and public service messages on radio and television. Nowhere is the role of IEC more critical than in the case of a fatal disease like AIDS, for which there is no cure but which can be prevented. Before the AIDS epidemic in Thailand, sex in brothels was popular recreation for local men and tourists, but condom use was low: only about 15 percent of commercial sex acts were protected in 1988. That figure rose to more than 50 percent in 1989–90, even before the launch of wide-ranging condom promotion campaigns, when the government informed the public that 44 percent of sex workers in the city of Chiang Mai were infected with the human immunodeficiency virus.

There may be high social payoffs from policies that improve the collection and dissemination of information about education and the opportunities open to more-educated people. Many countries are reforming their national training systems to include employers and private providers in planning and in coordinating provision. Such policies must be accompanied by efforts to put the information to good use (Box 3.5).

Governments have recently been doing more to provide information about, for example, test score improvements and placement records for students in particular schools and training programs. The reporting of nationally recognized test scores often impels parents and communities to action. The publication of national rankings based on the Third International Mathematics and Science Study has drawn the attention of many policymakers. Such comparisons, when done for schools within a country or district, might also better inform parents. These efforts would also, one hopes, stimulate debate about the overall objectives of the education system and the extent to which testing can capture them.

Another way that governments dispense information is through accreditation. Many industrial and some developing countries now have well-designed school inspection schemes in place, to provide a “stamp of approval” for schools that meet quality standards. Where the public sector does not, or cannot directly, accredit institutions, private voluntary accreditation agencies can be encouraged to take on this function. This has been done in the Philippines, and Brazil, Chile, Colombia, Mexico, South Africa, and Tanzania are following suit.

Helping poor people pay for education

Estimated private rates of return to education in developing countries—more than 30 percent a year for primary and about 20 percent a year for secondary and tertiary schooling—are enough to gladden the heart of any investment banker. Yet many would-be students in these countries cannot invest in their own education because

Box 3.5

From providing training to providing information

Retraining is vital for a country’s economic restructuring. But mismatches between formal training programs and the evolving skill needs of employers have been a persistent problem, often resulting in very low rates of return to resources, public and private, devoted to such training. One way to improve performance is to move from direct provision to government intermediation between provider and trainee. This can reduce the information costs that can lead to such mismatching.

A program proposed in Madagascar will serve workers in 45 state enterprises facing restructuring, in preparation for their privatization or liquidation. A previous, failed attempt to facilitate these workers’ redeployment was heavily centralized and information-intensive. The agency in charge had to identify the sectors and activities in which the soon-to-be-separated workers could work and then provide them with appropriate training. And it had to help those planning to launch their own microenterprises to design a business plan and buy the appropriate equipment. Many separated workers received their equipment years after losing their jobs. By that time they had moved on to other activities, so most of them simply sold the equipment. Despite costs of roughly \$900 per worker, dissatisfaction with the program was widespread.

In the new redeployment program, the agency in charge provides a menu of training and redeployment services, but separated workers choose whether to “buy” those services. First, from a study of the labor market, the agency calculates the present value of the earnings loss each separated worker will experience. Simultaneously, the agency launches a tender for redeployment services, which is open to other government bodies, private providers, and nongovernmental organizations. Next, the agency runs a workshop at the plant, where all the retained bidders describe to the workers to be separated the redeployment service they propose. Finally, each separated worker decides which services to buy.

The government agency discounts the cost of these services from the amount of assistance allocated to each worker, pays the rest in cash, and pays the retained bidders upon delivery of their services. Workers have the right to get all their compensation in cash if they do not consider the services worth their cost. This minimizes the risk that large sums will be wasted in useless training and redeployment efforts.

they cannot pay for it. Education requires considerable private resources, even when it is “free” in the sense that no fees are charged. Perhaps most important are the opportunity costs: the time that a student spends in school, or a trainee in a training program, is time not spent working in the labor market, in the family enterprise, or in

household activities such as care for younger siblings (a task that, because it often falls to girls, may contribute to their lower enrollment rates).

If credit markets for human resource investments are imperfect—as indeed they seem to be almost everywhere—households, particularly poor households, may not be able to finance investments in education, despite high expected rates of return. Their lack of access to credit reflects information problems. Would-be lenders cannot properly assess the returns to investing in human capital, nor can such capital be collateralized.

In such circumstances a poor student or trainee, even one with the brightest prospects, finds it difficult to mobilize the requisite funds. A recent survey of 42 studies from 21 mostly developing countries reports that income is a significant constraint in at least three-fifths of the studies. In Peru, children from lower-income households whose siblings are more closely spaced in age begin withdrawing from school at a younger age. In Vietnam a 10 percent increase in longer-run household income is associated with a 7 percent increase in educational attainment (grades attended) and an 8 percent increase in cognitive achievement.

This state of affairs is not only inequitable but inefficient as well. It deprives society of a larger pool of able people who have benefited from learning. Simulation analysis of data from Colombia in the 1980s concludes that, if the selection of students from secondary to tertiary education had been based on innate ability alone, the share of tertiary enrollment from the poorest 40 percent of the population would have increased significantly, and average verbal and mathematics test scores would have increased by 14 percent.

Credit constraints might also adversely affect the composition of educational offerings. In the Philippines—whose university system boasts one of the highest enrollment rates in the developing world, rivaling those of many industrial countries—the private sector provides 80 percent of tertiary education. But private schools must compete by offering only those courses that cover their costs. This works to the detriment of course offerings with high fixed costs for laboratory equipment and the like. Over 90 percent of enrollments in the Philippines are in vocational programs with a specific occupational goal. The most popular is business, which accounts for 40 percent of private sector tertiary enrollment (but only 21 percent of public sector enrollment). And mathematics and natural sciences are underemphasized: the enrollment rate in for-profit private schools is a minuscule 1 percent, compared with 4 percent in public schools. This is not necessarily a bad outcome: if private sector schools specialize in areas where demand is strong, that frees up scarce public resources for other areas where the externalities are greater.

The best solution to credit market failures is to relieve the credit constraint. Many countries have government-run (or government-backed) student loan programs covering tuition, living expenses, or both. These loans are supposed to be repaid from the borrower's earnings after graduation. But a review of 50 such schemes indicated that many were insolvent. The main problems were heavily subsidized interest rates, high default rates, and high administrative costs. In the first Brazilian student loan scheme in 1983, default rates were high despite generous real interest rates of –35 percent.

The few success stories of student loan schemes yield some important lessons:

- Subsidies should not be hidden in highly subsidized interest rates, but instead made transparent in the form of scholarships.
- Programs need to be well targeted to those in need.
- Combining loans with work-study programs helps lower-income students.
- Making repayment contingent on income after graduation does more to balance the imperative of cost recovery against the risk to the borrower (Box 3.6).
- Program solvency also requires fostering a “credit culture” that encourages borrowers to be conscientious about repaying their loans.

Should education be subsidized? And if so, how? Even when the credit constraint is removed, if credit markets redistribute risk imperfectly there may still be underinvestment in education, and thus subsidies may be warranted. The question is even more pressing in countries—and there are many—that lack effective student loan programs. Many developing countries subsidize both schooling and formal training programs too heavily and indiscriminately. In francophone Africa, allowances for noneducational expenses constitute, on average, 55 percent of the tertiary education budget. These subsidies contribute to even graver problems due to fiscal restraints. Some countries, unwilling or unable to provide subsidies to all, simply limit access to higher education. The result is that subsidies that are high on a per-student basis go to a few individuals, who are almost certainly not poor. Other countries offer broader access to education but dilute its quality.

A basic problem is that subsidies are seldom targeted to those who deserve them or to the fields of study that warrant subsidization for efficiency and distributional reasons. Such subsidies must be redirected. Scholarships should go to the credit-constrained and to those who, because of their talent or their choice of discipline, are likely to generate positive externalities. Means-tested targeting may itself be encumbered by information problems, but it

Box 3.6**Income-contingent loans for tertiary education in Australia and New Zealand**

In 1989, in response to public demand to make tertiary education more effective and increase access for under-represented groups, Australia introduced its Higher Education Contribution Scheme. The scheme imposes a tuition fee at public universities but provides subsidized, income-contingent loans to help students defray the cost. Participating students defer repayment until their earnings after graduation reach a threshold, after which their payments are calculated as a percentage of their taxable income. The principal is indexed to the consumer price index, but the real interest rate is zero.

With repayment thus tied to income, default risk is reduced, and repayment can be stretched out over many years. And since the real interest rate is zero, those taking longer to repay the full amount (those less active in the labor force or who realize low returns to their schooling) receive more of a subsidy than those required to pay off the loan more quickly.

In 1992, New Zealand instituted an income-contingent loan program that does not completely subsidize the interest on the loan. As in Australia, only students with earnings above a given threshold are required to make repayments, but repayments are the same percentage of income (above the threshold) for all borrowers. Repayments are also adjusted for inflation. For those borrowers deemed able to afford it, the real interest rate is set equivalent to the government's cost of borrowing, thereby reducing the subsidy that a zero real interest rate represents.

may be less onerous for tertiary education than for lower levels, because the students are fewer.

Upgrading education systems through new content and new media

New curricula for a new world. Governments play an important role in adapting school curricula to foster national, regional, and global integration and to transmit new information to schools and educators. New perspectives on how students learn are regularly explored and the findings disseminated to teachers. And teachers are exposed to new technologies that may help them in the classroom—or beyond the classroom—through a variety of government-supported in-service training opportunities.

Beyond this, governments can serve as a conduit for new knowledge in rapidly evolving fields of science and technology, to ensure that curricula stay up to date. In Vietnam the draft primary curriculum includes information about computers (including the Internet), to prepare students to enter modern society. Governments may also promote the inclusion of fields of study already familiar

elsewhere but new to the country in question. In the transition economies of Europe and Central Asia such “new” fields may include economics, accounting, civil rights law, and business administration, as well as topics in history and geography previously proscribed. In these and other countries, curriculum expansion may also entail including material that has increased relevance in modern economies, such as environmental studies or the mathematical logic underlying the use of computers. A textbook recently approved by the Russian Federation's Ministry of Education for use in public schools, titled *The Adventures of a Little Man*, features a little green man who uses the court system to defend the environment against polluters and their powerful cronies.

Using new technology in the classroom. Today's technologies, as Chapter 4 will show, have enormous potential to increase access to education and reduce its unit costs. Radio distance education has already shown this for basic education.

Some education systems, especially in Latin America, have a long and well-documented history of using distance education. One approach, interactive radio instruction, delivers lessons by radio or audiocassette, accompanied by carefully integrated classroom activities facilitated by a teacher. Students respond to questions and do exercises while the program is on the air. The goal is mainly to improve educational quality, but the program also aims to increase access.

Interactive radio instruction was originally developed to teach primary school mathematics in Nicaragua in the mid-1970s. Analysts concluded from two controlled studies that these programs were more effective in increasing learning ability than an alternative program that simply provided additional textbooks. Following Nicaragua's lead, 18 other countries have since developed interactive radio programs for a range of subjects and learning environments. Test scores for students in these programs indicate gains of 10 to 40 percent over control groups. For some programs, the marginal resources employed are about two-thirds more effective in raising test scores than equivalent resources used for textbooks—and more than 10 times more effective than resources used for teacher education.

Computer-aided instruction has expanded substantially with the rapid decline in the costs of hardware and software. The most prominent use of computers in schools has been as a practice tool for basic skills. Many studies suggest that students show learning gains equivalent to one to eight months' worth of a year of traditional schooling when computer drills supplement traditional instruction. But the gains are much smaller when the computer replaces rather than deepens traditional instruction. Most studies also report increases in attendance, motivation, and attentiveness. More systematic studies analyzing the

returns to such innovations, especially in controlled experiments, would be useful to determine the desirable levels of investment in these areas.

New technology for training teachers. Distance education has been advocated as a cost-effective means of increasing the number of qualified teachers—a major bottleneck limiting the expansion of formal schooling, particularly in South Asia and Sub-Saharan Africa. Several of these programs point to possible advantages over conventional teacher training, others to limits.

Distance education has been found to reach more teachers than conventional methods using the same amount of resources. Pass rates are in some cases similar, and in others notably higher or lower, than in conventional courses. In Indonesia, Sri Lanka, and Tanzania, teachers trained at a distance performed less well in science and mathematics than did those with conventional training.

These comparisons do not lead to definitive conclusions, because the underlying studies do not control well for other differences between teachers in the two groups. Given the limited success and much higher cost of conventional programs, however, the comparisons suggest that distance teacher training should be considered as a supplement, if not an alternative, to conventional programs.

Open universities. The most promising gains to new technology may come from its use in tertiary education. Pressure is mounting to increase access to tertiary education without diluting quality, especially in middle-income economies that have raised their secondary school graduation rates. These same countries confront the need to upgrade their labor force skills in the face of global competitive pressures. How can they provide relevant and good-quality higher education at an affordable cost? Here again, distance learning may be a viable alternative.

Distance education at the tertiary level has a long tradition in most industrial countries and in many developing countries, including China, Costa Rica, India, the Islamic Republic of Iran, Kenya, Pakistan, Tanzania, Thailand, and Venezuela. It can help developing countries with too few classrooms and teachers get around these resource constraints. Videoconferencing, for example, lets students from all parts of a country speak directly with the best teachers. Examinations can be administered on-line, and course materials and homework can be exchanged by e-mail. The virtual classroom is more effective, however, when complemented by face-to-face interaction between teacher and student. At a minimum, there is an ongoing need for teachers capable of customizing content to local needs and requirements.

Traditional universities are turning to distance learning to supplement their on-campus activities. In China, half of the 92,000 engineering and technology students who graduate each year do so through distance education from such traditional universities. Meanwhile a logical

extension of the distance learning concept, the “open university,” caters exclusively to distance learners. Open universities are growing in size and number. Today there are 11 so-called mega-universities—open universities enrolling more than 100,000 students per year—operating worldwide. Most have been established in the last quarter century, many of them patterned after the United Kingdom’s Open University.

A variant of the open university, the virtual university, uses satellites and the Internet to deliver courses, allowing people in scattered locations to share resources. The Virtual University of the Monterrey Institute of Technology, in Mexico, is a consortium of collaborating universities, including 13 outside the country. Founded in 1989, the Virtual University enrolls 9,000 degree and 35,000 non-degree students each year throughout Mexico and several other Latin American countries. It delivers its courses through printed texts and live and prerecorded television broadcasts. Communication between students and faculty is facilitated by Internet connections.

Another virtual university is being established for Africa, with support from the World Bank (Box 3.7). As these experiments go forward, it will be important to assess the returns more precisely.

Lifelong learning. As the store of human knowledge continues to grow in size and complexity, and to be updated at an ever-faster pace, people the world over need to engage in structured and systematic learning throughout their lives. Lifelong learning is especially important in developing countries, where most adults never received basic education during their youth. For many of them, lifelong learning starts with basic literacy and numeracy. Modern communications technologies allow them to learn at their own pace outside school or the workplace. For example, women in a community group in South Africa, with the help of one of their peers who has the equivalent of two years of high school education, download information about adult education programs that they would otherwise not be able to afford. Thanks to advice they found on-line about vegetable farming, they recently harvested their first crop.

The picture of a society committed to lifelong learning, then, presents more than the familiar scene of 8-year-olds engaged full-time in learning the basics of reading, writing, and math. It also includes grandparents passing on their language and value systems to their grandchildren, while they in turn introduce their elders to the intricacies of the Internet, helping them gain access to information that will enlighten and give sustenance to their later years.

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Basic education is the foundation for building a healthy, skilled, and agile labor force and for competing

Box 3.7**The African Virtual University**

Many African universities lack top-quality professors, up-to-date materials, adequate facilities for teaching and research, and modern curricula, particularly in science and technology. And even these meager resources are accessible to only a privileged few—despite keen demand throughout Africa for qualified scientists, engineers, and business leaders.

The African Virtual University was launched in 1995 to remedy this shortfall by offering high-quality university education at a distance. Its mandate is to increase university enrollments and improve the quality and relevance of instruction in science, engineering, and business throughout the continent. In each participating country a local institution is competitively selected to oversee operations. It registers students, supervises study programs, and offers a structured study environment. It also helps with technology problems, provides hardware and software for interactive courses, and awards local credit for courses taken.

The African Virtual University's headquarters in Nairobi provides tutoring for students and training for professors and teaching assistants in the use of electronic teaching media. It installs and services all the required software and hardware, standardizes teaching practices and monitors quality control, sets price structures, and conducts marketing campaigns. And it purchases the best available distance education curricula and instructional materials from around the world and adapts them to local needs.

The university hopes to offer relevant short courses in high-demand subject areas at affordable prices. So far it has installed 27 satellite receiver terminals, with 12 each in English-speaking and French-speaking countries and three in Portuguese-speaking countries. And to compensate for the dearth of scientific journals in African universities, it has developed a digital library.

successfully in world markets. Education beyond the basics—both through teaching and through research—also has a role in securing the ability of countries to assess, adapt, and apply new, information-based technologies.

Despite the expansion of enrollments in recent decades, success in extending quality education to all has been limited, and new challenges have emerged. In still too many settings, some groups—the poor, girls, adults who have long since left school without learning basic skills—have not shared in the gains. Many school systems in developing countries fail to meet even basic academic standards. Meanwhile, demand for secondary and tertiary education is rising faster than the public sector can provide it.

Solving information problems in education systems is the key to addressing these challenges. Ignorance about the full benefits of education prevents individuals and their

families from making optimal schooling decisions. Capital market imperfections that are rooted in lack of information about student borrowers stand in the way of appropriate private investments, especially in tertiary education. More public spending, if uninformed, is not likely to solve the quality problem. Given the limitations on resources and capacity in education systems, notable improvements in the quality of education may come only by involving consumers (parents and local communities) directly in school decisionmaking. Reforms that have embarked in this direction appear to have hit the mark. And finally, just as new technologies have broken age-old barriers in the production of goods and services, increasing yields or reducing costs, so too innovative methods of imparting skills and knowledge hold promise for breaking existing barriers to greater access and improved quality in education.