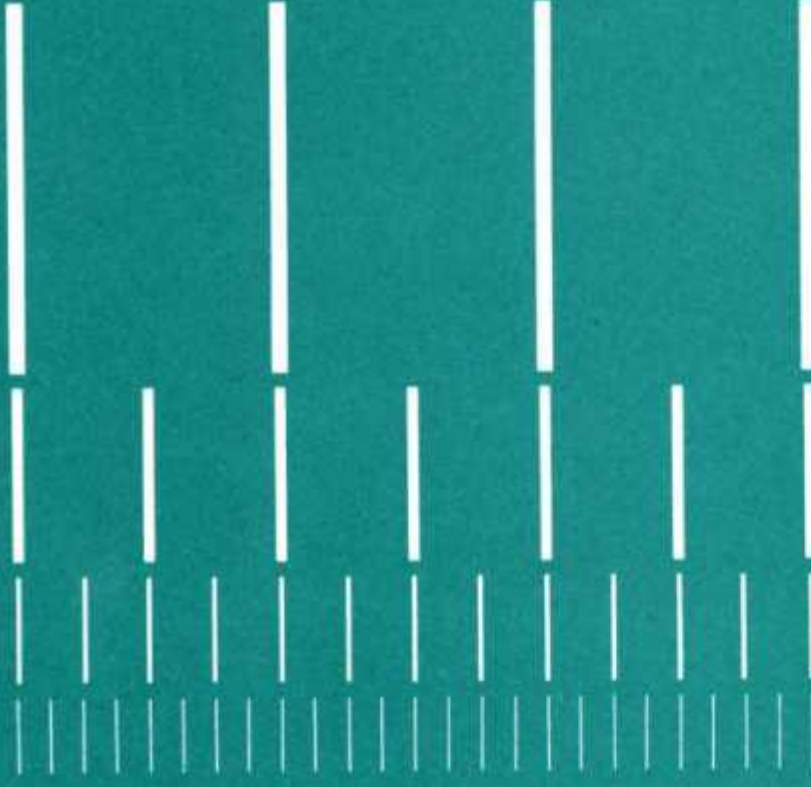


Cost analysis of educational inclusion of marginalized populations

Mun C. Tsang



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Fundamentals of educational planning

The booklets in this series are written primarily for two types of clientele: those engaged in educational planning and administration, in developing as well as developed countries; and others, less specialized, such as senior government officials and policy-makers who seek a more general understanding of educational planning and of how it is related to overall national development. They are intended to be of use either for private study or in formal training programmes.

Since this series was launched in 1967 practices and concepts of educational planning have undergone substantial change. Many of the assumptions which underlay earlier attempts to rationalize the process of educational development have been criticized or abandoned. Even if rigid mandatory centralized planning has now clearly proven to be inappropriate, this does not mean that all forms of planning have been dispensed with. On the contrary, the need for collecting data, evaluating the efficiency of existing programmes, undertaking a wide range of studies, exploring the future and fostering broad debate on these bases to guide educational policy and decision making has become even more acute than before.

The scope of educational planning has been broadened. In addition to the formal system of education, it is now applied to all other important educational efforts in nonformal settings. Attention to the growth and expansion of educational systems is being complemented and sometimes even replaced by a growing concern for the quality of the entire educational process and for the control of its results. Finally, planners and administrators have become more and more aware of the importance of implementation

strategies and of the role of different regulatory mechanisms in this respect: the choice of financing methods, the examination and certification procedures or various other regulation and incentive structures. The concern of planners is twofold: to reach a better understanding of the validity of education in its own empirically observed specific dimensions and to help in defining appropriate strategies for change.

The purpose of these booklets includes monitoring the evolution and change in educational policies and their effect upon educational planning requirements; highlighting current issues of educational planning and analyzing them in the context of their historical and societal setting; and disseminating methodologies of planning which can be applied in the context of both the developed and the developing countries.

In order to help the Institute identify the real up-to-date issues in educational planning and policy making in different parts of the world, an Editorial Board has been appointed, composed of two general editors and associate editors from different regions, all professionals of high repute in their own field. At the first meeting of this new Editorial Board in January 1990, its members identified key topics to be covered in the coming issues under the following headings:

1. Education and development
2. Equity considerations
3. Quality of education
4. Structure, administration and management of education
5. Curriculum
6. Cost and financing of education
7. Planning techniques and approaches
8. Information systems, monitoring and evaluation

Each heading is covered by one or two associate editors.

The series has been carefully planned but no attempt has been made to avoid differences or even contradictions in the views expressed by the authors. The Institute itself does not wish to impose any official doctrine. Thus, while the views are the responsibility of the authors and may not always be shared by UNESCO or the IIEP, they warrant attention in the international

forum of ideas. Indeed, one of the purposes of this series is to reflect a diversity of experience and opinions by giving different authors from a wide range of backgrounds and disciplines the opportunity of expressing their views on changing theories and practices in educational planning.

The present booklet is concerned with estimating the cost of various strategies of educational inclusion. In a large number of countries a high proportion of children still do not attend school or do not have access to good learning experience and thus drop out after a few years. This proportion often appears incompressible as such children often come from an economically and culturally deprived background, as resources are scarce and many other priorities appear more pressing. By not attending schools the chances of such children ever integrating into society become extremely weak. Yet for equity as well as for long-term economic and political reasons, societies should be concerned with the educational inclusion of the last 20, 30 or sometimes 50 per cent of their population. This will call on more resources, as programmes for educating such a population are normally more costly. It is thus very important to develop proper techniques and instruments to help educational planners cost and choose the most efficient programmes. Recognizing the importance of the topic of educational inclusion, the Editorial Board requested Professor Mun Tsang of Michigan State University in the United States to prepare a booklet where such techniques and instruments were described.

The Institute would like to thank Douglas M. Windham, Distinguished Service Professor, State University of New York at Albany, special editor of this issue, for the very active role he played in its preparation.

Jacques Hallak
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Preface

In his book, *A theory of justice*, (1971) John Rawls asserts that: "... to treat all persons equally to provide genuine equality of opportunity, society must give most attention to those with fewer native assets and to those born in the less favourable social positions." Unfortunately, the fulfilment of this responsibility has been seen as competing with efforts to enhance the efficiency of societal expenditures on these 'marginalized' populations. This conflict is most evident in the provision of education and training.

The question of efficiency in social expenditure involves the sub-issues of effectiveness and cost. To measure the effectiveness of educational systems one must first identify the goals of education and training. Traditionally, most societies have stipulated an increased equalization of social opportunities as one of the major goals of education and training activities. Such equalization requires that access to, and success within, education and training programmes be extended to those individuals and groups who have been under- or unrepresented in the past.

Too often, however, attempts in education to extend social inclusion (the participation of marginalized populations) have not been appropriately costed or financed. The result is either to create excessively expensive activities for which it is difficult to maintain public support or to create programmes that do not have sufficient resources to provide marginalized learners with the necessary remedial or compensatory experiences. Efficiency is not synonymous with low cost; to achieve efficiency in many educational programmes for the disadvantaged would require a greater, not a smaller, expenditure of funds. This suggestion of increased expenditures often is countered by questions of affordability. A terribly difficult challenge to many educational planners is the

choice of broadening access to an inadequate quality of education or an acceptance of continued restrictions on social inclusion as a means of 'financing' quality learning experiences for those limited few fortunate enough to gain access to the education and training system. The most common result is a system of heterogeneous quality wherein some pupils gain access to quality while others, often a majority, are relegated to inferior and often inadequate learning experiences.

The solution to this problem of inequitable access will require an increased willingness on the part of society to pay for appropriate levels of educational quality for all pupils and an enhanced capacity to identify accurately the cost levels of broadened inclusion. Professor Mun C. Tsang has combined his expertise in the theory of cost estimation with his wide field experience in social policy analysis to produce a volume designed to help educational planners forecast the cost implications of various strategies of educational inclusion. The techniques and strategies presented here will prove extremely useful for all planners engaged in the planning and implementation of programmes to broaden aggregate access or to improve the length and quality of learning opportunities provided to individuals and groups who presently are not full participants in education and training.

The ultimate challenge to educational planners will not be the technical ability to achieve educational goals for marginalized populations; rather the challenge will be to mobilize societal willingness to assign a sufficient priority to this goal. Professor Tsang has increased the probability of achieving that mobilization by providing planners with the means to estimate accurately the costs of educational inclusion of marginalized groups.

Douglas M. Windham
Associate editor

Contents

Preface	9
Introduction	13
1. Social inclusion of marginalized populations	13
2. Cost analysis and educational inclusion of marginalized populations	17
3. Methodologies of cost analysis for educational inclusion of marginalized populations	18
Chapter I Programmes for educational inclusion of marginalized populations	21
1.1 Identifying marginalized populations	21
1.2 Educational inclusion programmes	27
1.3 The scope of cost estimation	29
Chapter II Methodologies of cost analysis	31
2.1 Costs of educational inclusion programmes	31
2.2 Collecting information on marginalized populations	39
2.3 Estimating the costs of educational inclusion	47
2.4 Projecting the costs of educational inclusion	63
2.5 Analyzing the costs of educational inclusion	66

Contents

Chapter III	Applications of cost analysis	68
3.1	Costing and financial evaluation	68
3.2	Efficiency and cost evaluation	83
3.3	Cost containment and cost comparison	89
Chapter IV	Information system of costs of educational inclusion	92
4.1	The need for an information system on costs	92
4.2	A framework for an information system on costs	93
Bibliography		103

Introduction

This introduction defines a ‘foundational’ approach to educational inclusion of marginalized populations, explains why government policy-makers and planners should be concerned about the costs of educational inclusion of marginalized populations, and indicates the range of methodologies that is covered in this booklet for analyzing the costs of educational inclusion of marginalized populations.

1. Social inclusion of marginalized populations

Marginalized populations refer to population groups within a society whose interests are not represented by the core polity of the society. Because of their inferior or disadvantaged position with respect to the socio-economic, political, or cultural power structure of society, they lack influence on government policies on national development and they are the last groups to benefit from the fruits of national development.

Marginalized populations are often identified according to socio-economic or cultural characteristics such as income or wealth, ethnicity or race, gender, geographical location, religion, citizenship status, or physical or mental conditions. Such populations are often associated with the poor, non-dominant ethnic, racial or religious groups, populations living in rural and especially remote areas, populations with refugee or alien status, and those with physical or mental handicaps; females are more likely than males to be marginalized in most societies. Examples of marginalized populations include most of the members of native Indian, black, and Hispanic groups in the USA, most groups of non-Anglo Saxon heritage in the United Kingdom, the native aborigines in Australia, the lowest caste social groups in India and in Nepal (such as the

untouchables), nomadic groups and populations living in rural, remote, or mountainous areas in many developing countries, refugees and non-resident aliens in OECD countries, females in countries who face discriminatory cultural and/or economic practices, and in general the poorest populations in any country.

In many countries, marginalized populations suffer from a 'convergence of disadvantage,' that is, they have multiple characteristics which are associated with a disadvantaged position in society. For example, poor refugee individuals from a non-dominant racial background or poor women living in rural areas face more than one barrier to social mobility in their society. It should be noted, however, that marginalized populations are defined with respect to a specific country context. A population group of certain socio-economic or cultural characteristics may be marginalized in one country but may not be so in another country.

Social inclusion of marginalized populations refers to the integration of such population groups in the national development process of a given society. This integration consists of at least two aspects: increasing the decision-making power of marginalized populations, and assuring that marginalized populations do partake in the fruits of national development. The first aspect is aimed at increasing the input of marginalized populations to decisions that affect society in general and the livelihood of marginalized populations in particular. This may involve, for example, an increase in access to positions of power in society by marginalized populations, reducing or removing implicit or explicit discriminatory practices against them, and empowering them through additional education. For many societies, this may be accomplished through moderate to fundamental changes in the power relationships in society.

The second aspect concerns the distribution of national resources among different social groups in society. It is often observed that substantial inequality in the distribution of national resources exists between marginalized groups and non-marginalized or core groups. Social inequality is a prevalent fact of life. Societies vary in the degree of inequality among social groups and in the notion of what constitutes an acceptable degree of inequality; they thus may differ in the share of national resources appropriated by marginalized populations.

One approach to social inclusion is the *social minima* approach (Windham, 1990) in which a 'minimum' or 'foundation' level of resources is defined that is made available to all members of society, including marginalized individuals. This foundation level of resources is defined with respect to the specific context of a given country and corresponds to a 'basket' of goods and services (such as, food, education, health, and other social services) that is considered essential for subsistence for members of that society. According to this approach, marginalized populations will be assured of at least this foundation level of resources, while non-marginalized populations will likely have resources beyond the foundation level. The key element in this approach lies in how the foundation level of subsistence is defined in a given societal context. Since subsistence will have different meanings in different societal contexts, the foundation level of resources will vary across countries. Thus, in financial terms, the foundation level for a country with a per capita GNP of US\$150 will not be the same as that for a country with a per capita GNP of US\$15,000. In theory, a higher-income country is capable of providing a higher foundation level for all its members, other things being equal. In practice, it is conceivable that marginalized populations in a lower-income and more equal society may have more resources than those in a higher-income and less equal society.

One concern of marginalized populations in any society is that the foundation level may be defined so low that it is below the minimum level for physical survival. This is related to who decides and whether or not marginalized populations have any input to the decision process that determines the foundation level. Presumably, the absolute minimum for a foundation level in any society is that which corresponds to physical survival.

A society should be concerned about the social inclusion of its marginalized populations for at least two reasons. First, from a moral or equality viewpoint, society should take care of its most disadvantaged members. Second, from an efficiency viewpoint, the social benefits of inclusion of marginalized populations (such as additional contributions by marginalized populations to national outputs, and reduction in the costs of social welfare/maintenance, and crime) can outweigh the resources needed to achieve such

social inclusion (Levin, 1989). In other words, expenditure on social inclusion can have a substantial rate of return.

The government has a legitimate role in the social inclusion of marginalized populations. First, to the extent that expenditure on social inclusion of marginalized populations can have a high rate of return to society, the government is the appropriate instrument to make the social investment on such populations. Second, if the inclusion efforts are left to individuals alone, there will be underinvestment in social inclusion. In countries where the market fails to ensure the social inclusion of marginalized populations, the government may have to intervene and make such groups the explicit target of its policies. Third, for some services that are considered crucial for social cohesion (such as primary education for inculcating a common set of values and beliefs), the government is considered the appropriate provider of such services for all members of society. Furthermore, in countries where the state historically has maintained a major presence in most aspects of social life, government involvement in achieving social inclusion of marginalized populations will be readily accepted.

Given a government role in social inclusion, government planners should be concerned about the marginalized population groups. Planners need to have access to relevant information about these groups in order to plan programmes for such groups. For countries where marginalized groups are diverse and constitute a sizable proportion of the total population, the planning tasks can be especially daunting. In addition, planners have to be concerned about how to finance programmes for these populations and whether resources are used efficiently in these programmes.

While social inclusion generally concerns a broad basket of goods and services, this booklet focuses on *educational inclusion*. In most countries, the foundation level of educational services for all members of society may be termed basic education; such services typically consist of basic schooling for children, and basic-literacy and skill-training programmes for adults (Inter-agency Commission, 1990). The contents and the length of basic education are defined within the context of a given country. For example, countries may differ in what each individual should know in order to be a contributing citizen; and the length of basic schooling may be four years, six years, nine years or more. The discussion of

educational inclusion can be extended to social inclusion with respect to other goods and services (such as food and nutrition, health, and other social services) because of education's effects on these other sectoral activities. Education can support and benefit from programmes in other sectors. For example, it has been documented that more educated farmers are more productive and that increased education is correlated with gains in health, nutrition, and population control (Windham, 1991; Lockheed and Verspoor, 1991: Chapter 1; Hallak, 1990: Chapter 3).

2. Cost analysis and educational inclusion of marginalized population

The costs of social inclusion of marginalized populations refer to the resources required to provide a foundation level of a given basket of goods and services to such members of society. With respect to education, they consist of the resources required to provide basic education to all marginalized members of society.

Costs are at the heart of several planning tasks regarding educational inclusion; these tasks include:

- (1) Cost estimation: as part of the preparation of a government budget, estimate the amount of resources needed for a given educational-inclusion programme.
- (2) Cost projection: estimate the costs of educational inclusion over time within the context of a medium- or long-term national plan.
- (3) Financial evaluation: in light of available resources, assess the feasibility of proposed educational-inclusion programmes.
- (4) Analyzing resource utilization: determine how resources are actually utilized in educational-inclusion programmes and compare utilization practices to available norms or standards.
- (5) Monitoring: monitor the costs of educational inclusion on a regular basis and assess whether progress has been made with respect to targets of social inclusion.

A number of cost issues may also be very important to consider for policy-makers and planners. They include the following:

- (1) **Improving efficiency:** given limited resources, there is a need to improve the efficiency in the utilization of resources devoted to educational inclusion. Cost analyses (such as resource-utilization analysis and cost-evaluation) can inform the improvement of both the internal efficiency (with respect to the immediate outputs of programmes) and external efficiency (with respect to the social outcomes of programmes) of educational-inclusion programmes.
- (2) **Promoting equity:** to the extent that the promotion of equity is a desirable social goal, it is necessary to examine how the costs and benefits of educational-inclusion programmes are distributed among different social groups and regions.
- (3) **Cost containment:** there is often mounting pressure for the government to control programme costs during periods of severe budgetary constraints. Knowledge about how resources are utilized in educational inclusion can contribute to informed decisions regarding cost containment.

3. Methodologies of cost analysis for educational inclusion of marginalized populations

This booklet discusses methodologies for the analysis of the costs of educational inclusion of marginalized populations. While a discussion of costing methods and applications for the general population is available in the literature (Levin, 1983; Coombs and Hallak, 1987; Tsang, 1988), the treatment of such methods and applications with particular attention to marginalized populations and their educational inclusion is lacking. There are at least three reasons why methodologies concerning marginalized populations may be different from those for the other population groups or the general population. First, characteristics of marginalized populations are different from the characteristics of the non-marginalized populations or the entire population. Some special data-collection procedure may be required to collect certain information on marginalized populations. Second, programmes designed specifi-

cally for marginalized populations are likely to be different from those for non-marginalized populations. Third, because of differences in input prices, programme design and other factors (explained in more detail in *Section 2.1.3*), the costs of programmes for marginalized populations are likely to be significantly different from those for average or non-marginalized populations.

The booklet discusses methodologies related to the following:

- estimating the costs of educational inclusion of marginalized populations;
- using cost analysis in the planning and policy analysis regarding educational inclusion of marginalized populations; and
- developing an information system for monitoring and analyzing the costs of educational inclusion of marginalized populations on a regular basis.

In presenting these methodologies, the booklet will provide practical examples, taking account of the diversity of social contexts, characteristics of marginalization, and applications of cost analysis. Whenever appropriate, it will expose underlying assumptions of methodologies, compare the advantages and disadvantages of alternative methodologies, and suggest practical methods.

Throughout the booklet, the costs of providing basic education to marginalized populations will be discussed to illustrate the methodologies involved. The scope of the discussion will include different modes of delivery of basic education, basic-education programmes for children, youth and adults, and with examples of application to both developing and developed countries.

The booklet is written primarily for planners at the national and state/provincial levels, and especially educational planners involved in basic education. Educational researchers and policy analysts may also find the methods discussed in this booklet useful to their work. In studying this booklet, the reader will acquire the methodologies of cost analysis for educational inclusion of marginalized populations, including:

- Procedures for identifying marginalized populations, collecting data, and estimating the total cost of educational inclusion.
- Schemes for classifying costs, based on type of inputs, sources of financing, and function of inputs.

Cost analysis of educational inclusion of marginalized populations

- Survey and other methods for collecting information from the government, households, and institutions or organizations that offer educational-inclusion services.
- The aggregate and ingredients approaches to costing.
- Methods and procedures for undertaking the common cost-related tasks in the planning of educational inclusion.
- Applications of cost analysis to planning and policy analysis regarding educational inclusion (such as costing and financial feasibility, cost evaluation, cost containment, and cost comparison).
- The use of cost indicators and indices in the planning, monitoring, and policy analysis regarding educational inclusion.

The rest of the booklet is organized into four chapters. *Chapter I* describes the procedure for identifying marginalized populations and discusses basic-education programmes for such populations. *Chapter II* is the core of this booklet. It identifies the costs of educational inclusion, describes and compares the methods for collecting information for cost analysis, and discusses the methodologies for three common cost-related tasks for planners: the estimation, projection, and analysis of costs of educational inclusion. *Chapter III* illustrates with examples the applications of cost analysis to planning and policy-making in educational inclusion. *Chapter IV* presents a framework of an information base for planning, monitoring, and policy analysis regarding educational inclusion on a regular basis.

Chapter I. Programmes for educational inclusion of marginalized populations

Before one can estimate the costs of educational inclusion of marginalized populations, one needs to identify both marginalized populations and the educational-inclusion programmes for these populations. This identification task helps to define the scope of cost estimation.

1.1 Identifying marginalized populations

As pointed out in the introduction, marginalized populations generally are defined as those population groups in a given society who are left out of the decision-making process that determines the direction of national development for that society and who are often the last groups to benefit from such national development efforts. From a planning perspective, marginalized populations can be broadly identified by first defining the foundational basket of goods and services and then identifying individuals whose consumption falls below that level. Since there are multiple items in the basket, a foundation level has to be defined with respect to each item. An individual who is marginalized with respect to one item may not be necessarily marginalized with respect to all the other items in the basket. However, an individual who is marginalized in one item is more likely to be marginalized also in some other item(s). In this approach, the marginalization of society is disaggregated into different aspects (food, education, health, etc.), based on items in the foundational basket.

To operationalize the above approach, take into consideration the identification procedure based on the educational aspect, that is, the educational inclusion of marginalized populations. The first step is for policy-makers to define the foundational level of

education. In most societies, this level may be defined as that minimum level of education which is necessary for functional participation in the social, economic, and political aspects of society and which is assured by the government to be made available to all members of society. In other words, the foundational level for educational inclusion is basic education. Educational inclusion for marginalized populations is not achieved if basic education is not made available to all marginalized populations.

The definition of educational inclusion varies across countries since 'functional participation' means different things in different societal contexts. In practice, educational inclusion is discussed in terms of the quantity and quality of basic education for all. For children and youth, the quantity of basic education is often expressed in the number of years of schooling. Some countries define basic education to be six years of schooling, other countries have a nine-year basic schooling, and some other countries have an even higher quantity for basic schooling. For many countries, basic schooling for all coincides with compulsory schooling. For some countries, however, many children and youth still lack access to the compulsory level of schooling, even though there may be a law (often unenforced) regarding compulsory schooling. Thus a compulsory-schooling law does not imply educational inclusion for marginalized children.

The definition of the quality of basic schooling is more problematic and there is little consensus among countries. In general, quality may be defined with respect to the input, the process, and/or the output of basic schooling. The quality of school input may refer to the competence and qualifications of teachers and school administrators, the availability of textbooks, and the availability of school buildings, equipment, and other facilities according to specified standards. The quality of the schooling process is often discussed in terms of class size, pedagogy, the school curriculum, and other management and organizational aspects of schooling. The output of schooling is diverse; it consists of both the 'internal' output such as the cognitive and affective learning acquired in school, and the 'external' output such as the effects of schooling on productivity, employment, and earnings of graduates.

For adults, a variety of basic-education or literacy programmes may exist. The quality of basic education for adults is often focused on achievement in a set of 'basic literacy' skills, such as the ability to read a newspaper and some level of writing skill.

The quantity and quality of basic education are determined in a political process; it is affected by the financial capacity of the government, the demand for basic education services, and the level of political support for basic education. For planning purposes, it is necessary to have quantitative measures for both the quantitative and qualitative aspects of basic education. This can be achieved through the use of *indicators* for educational inclusion purposes. Such indicators are statistics about basic education which reflect the status of educational inclusion. Since countries may vary in their definition of the quantity and quality of basic education, the set of educational-inclusion indicators may differ across countries. *Table 1.1* provides an illustrative list of educational-inclusion indicators for a low-income country.

In this table, the indicators are divided into two categories: indicators that deal with the quantitative aspects of basic education, and indicators that deal with the qualitative aspects of basic education. For each indicator, one can define a *critical* (or *threshold*) value (or range) with respect to which educational marginalization or educational inclusion is defined. For example, educational marginalization may be said to exist when the net enrolment in primary schooling (number of pupils aged 6 to 11 in primary schooling divided by number of children aged 6 to 11) is less than the critical value of .95; or alternatively, educational inclusion may be said to be achieved when the net enrolment ratio in primary schooling is within the critical range of .95 and 1.00. Similarly, educational marginalization may be said to exist when there are grade-6 pupils whose achievement in a grade-6 test is one or more grades below grade 6; educational inclusion for all may be achieved when the percentage of low achievers (one or more grades below grade 6) is 0 per cent. Children of ages six to eleven who are not enrolled in school or pupils who score one or more grades below their level may be defined as educationally marginalized.

Cost analysis of educational inclusion of marginalized populations

Table 1.1 Examples of educational inclusion indicators for a low-income country

Educational inclusion indicators	Critical value (range) for achieving educational inclusion	Incidence of educational marginalization
<i>Quantitative aspects</i>		
• Net enrolment ratio in grade 1	1.00	Age 6 (or 7) children not in grade 1
• Net enrolment ratio in primary schooling (grades 1-6)	0.95-1.00	Age 6-12 children not in primary schooling
• Adult literacy rate	95-100%	Adults not able to read and write
<i>Qualitative aspects</i>		
• Percentage of students having textbooks in primary schooling	100%	Students without textbooks
• Dropout rate in grade 1	0%	Grade 1 students dropping out
• Percentage of primary schools with unsafe buildings	0%	Buildings with major cracks, likely to fall down
• Percentage of primary classes with excessive overcrowding	0%	Classes with over 70 pupils
• Percentage of grade 6 students who underachieve	0%	Pupils achieving at grade 5 level or below

Basic education for higher-income countries often refers to nine or more years of schooling. For these countries, indicators on the quantitative and qualitative aspects of secondary schooling are necessary.

By collecting information from households and/or educational institutions periodically (see discussion in *Chapter II*), educational-inclusion indicators can be constructed and examined over a period of time. These indicators have several planning-related uses. First, they are the measures for defining educational marginalization and they enable the planner to identify the background or other characteristics of the marginalized population. They help to define the targets of educational-inclusion efforts. For example, one may

find that, in a certain country, 10 per cent of the rural boys of age 6 and 30 per cent of the rural girls of age six are not enrolled in grade one. Second, they show the status of marginalization (or alternatively, educational inclusion) at a point in time and indicate the trend in marginalization over time; in other words, they indicate the magnitude of the marginalization problem. An indicator based on achievement test may show that, over a period of ten years, the proportion of low-achievers has increased significantly and that the low-achievers are concentrated among a certain racial/ethnic group. Third, one can assess the effects (or lack of effects) of an educational inclusion effort by monitoring the values of the indicators over time. For example, one may find that, after five years, the rate of basic literacy for adults may increase from 50 to 65 per cent. The above procedure for defining educational inclusion can be applied to other aspects of social inclusion.

Example 1.1 Examples of educational-inclusion indicators for a number of countries in the early 1990s

Ghana had a per capita GNP of US\$390 in 1990; the gross enrolment ratio was 67 per cent in primary school and 45 per cent of primary-school pupils were girls. Many schools were in poor physical condition and many pupils did not have textbooks. In Ghana, basic schooling may be defined as six years of primary schooling. Since access to primary schooling is a significant problem, a quantitative indicator of educational inclusion, such as the net enrolment ratio in primary schooling, is highly pertinent. This indicator may be defined for the whole population, as well as for sub-samples of the population (for boys and for girls; for children outside the urban centres of Accra, Kumasi, and Takoradi; for children in different provinces, especially children in the poverty-stricken provinces in the north). Supplemental indicators of educational inclusion may focus on the availability of textbooks to primary-school pupils and the physical safety of primary schools.

Pakistan, a country with a per capita GNP of US\$380 in 1990, exhibits problems of low access (50 per cent enrolment rate in primary schooling) and low quality in primary schooling similar to those in Ghana. Indicators on the quantitative and qualitative aspects of primary schooling are relevant. In addition, because of

cultural and other factors, girls have a substantially lower enrolment rate in primary schooling than boys. Thus, indicators of educational inclusion for girls should receive attention. Also, figures from the mid-1980s show that 15-20 per cent of primary schools do not have school buildings! (These are mostly 'schools' in remote/mountainous and some rural areas). An indicator on the percentage of primary schools with school buildings would be relevant in the Pakistani context.

Compared to both Ghana and Pakistan, China, with a similar level of per capita GNP (US\$370 in 1990), has much less of a problem in terms of access to primary schooling. According to Chinese statistics, about 3 per cent of children are not in primary school; these absent children are mostly in rural/remote areas, and girls from minority and rural backgrounds. Pupils in primary schools also have textbooks (paid for by the parents); the disparity in educational opportunities between boys and girls is relatively small. Yet there are large differences in quality between rural schools and urban schools, and among urban schools ('key' urban schools and 'non-key' urban schools), in terms of pupil achievement, quality of the teaching staff, and physical conditions and facilities. Indicators of educational inclusion may thus focus on the qualitative aspects of primary schooling plus the access to schooling for the children groups not in primary school. In 1985, the Chinese government defined compulsory and basic education to be nine years of schooling. Although nine years of schooling has been achieved in quantitative terms in many urban areas and some rural areas by the early 1990s, it remains a difficult target for many rural and inland regions. The concern of educational inclusion in the 1990s may be directed at the primary level; lower-secondary schooling may be the focus after the year 2000.

For the three countries of Ghana, Pakistan, and China, an indicator of adult literacy is also relevant since a significant proportion of the adult population are illiterate. For example, the adult illiteracy rate was 40, 65, and 27 per cent respectively for Ghana, Pakistan, and China in 1990 (World Bank 1992: 218).

In the USA parents are required to keep their children in school until age 16. Most children do stay in school until the required age but a significant proportion (about 25 per cent) of them drop out of high school (upper-secondary schooling). If basic schooling is

defined as nine to ten years of schooling, educational inclusion, in quantitative terms, is essentially achieved for all children (boys and girls, in rural and urban areas, for various income classes). But there are significant differences in educational quality for children from different backgrounds. Throughout the nine or ten years (or even twelve years because of labour market requirements in the USA) of basic schooling, children from certain backgrounds (black and Hispanic minorities, and lower socio-economic classes) are much more likely to receive an inferior schooling experience, especially in terms of process (how they are taught) and output (such as achievement and subsequent educational and occupational attainment). In fact, these 'at-risk or disadvantaged' children often already have had inferior learning experiences (in educational, emotional, nutritional, and health terms) compared to their counterparts before they enter grade one. Educational inclusion in the USA may thus focus on the early-childhood preparation and the quality of basic schooling of individuals from at-risk backgrounds.

The above example shows that different countries will likely have different definitions and measures of educational inclusion. But the same principle of educational inclusion remains; that is, within a given country, educational inclusion is aimed at assuring that the same foundational package of educational experience (in quantitative and qualitative aspects) is provided to all members of the society of that country.

1.2 Educational inclusion programmes

There are a wide variety of programmes that can be used for achieving basic-education/literacy for marginalized populations. They are programmes targeted at different age groups; they differ in the mode of delivery; and they have different sponsors. In general, these programmes can be divided into three broad categories: early childhood programmes, programmes for children and youth, and programmes for adults.

Early childhood programmes can be provided to children from marginalized backgrounds. These may be pre-school and/or kindergarten educational programmes that prepare children, in terms of cognitive and social skills, for a smooth transition into primary

school. They may also be health or nutrition related programmes that make sure that such children are physically fit to participate and benefit from primary schooling. An early childhood programme can be considered an educational inclusion programme for marginalized populations if it improves the likelihood that pre-school aged children from marginalized backgrounds can subsequently achieve basic education.

Primary and secondary schools for children and youth are the most widely recognized programmes for achieving basic education. In some countries, limited access to these regular programmes is a major problem. In other countries, access is not a problem, but the basic education programmes are characterized by poor quality and high dropout rates. The basic principle of educational inclusion implies that regular programmes of acceptable (country-specific) quality should be made available to all children and youth. Other educational programmes that seek to assist marginalized children and youth in achieving basic education of acceptable quality are also considered educational-inclusion programmes. These programmes may include 'second-chance' school-equivalency programmes for dropouts, remedial educational programmes, or other forms of educational interventions to boost the achievement of educationally at-risk or disadvantaged children and youth. Regular programmes are generally offered in the traditional setting of the classroom and school. Other education programmes may take place in the school, in other institutions, or through distance education.

As for adults, there exists a variety of non-formal basic-literacy and skill-training programmes. To provide flexibility to their intended clients, these programmes often differ in length, schedule, and location. They are provided by both government and non-government agencies. Within the government, some programmes are administered by the education ministry or department while others are administered by non-education ministries or departments. Some programmes take place in institutional settings while others may be offered through radio, television, correspondence, or other media.

For a given programme in each of the above three age-based categories, there may be up to three forms of programmatic efforts for educational inclusion. First, an existing programme is under the foundation level of quality deemed desirable for all its clients. For

example, many schools in primary schooling may have unsafe school buildings, below-standard equipment, and insufficient reading materials. Thus, there is a need (and thus a cost) for *upgrading* the quality (especially in terms of inputs and process) of existing schools for the existing pupil population. Second, an expanded programme may be needed to accommodate new pupils who are similar in backgrounds to the existing pupil population. For example, new schools are needed to provide school places to children of similar backgrounds not previously in school. These children can be new additions to the school-age population or existing ones not in school because of limited supply or other factors. There is a cost to *broadening access to similar groups*. Third, new or expanded programmes are needed to accommodate new pupils who are different in backgrounds from the existing ones. Thus, new school places are needed for new groups (such as marginalized groups not having access to basic schooling). Again, there is a cost to *broadening access to new groups*.

The diversity of educational-inclusion programmes means that the planner has a multiplicity of methods for planning basic education for marginalized populations. It is important to realize that although public formal schooling is often the major strategy for providing basic education, programmes in the non-education sector and programmes provided by non-government organizations can also contribute to the achievement of basic education for all. And within the government, there should be more coordination among different ministries or department in providing programmes that support basic education to marginalized populations.

1.3 The scope of cost estimation

Each country will select and design its own set of educational-inclusion programmes, based on its own definition of educational inclusion, characteristics of its marginalized populations, and other country-specific considerations. The decisions regarding marginalized populations and educational-inclusion programmes will subsequently define the scope of the cost estimation of educational inclusion for such populations. But in general, one may observe the following scope of cost estimation:

Cost analysis of educational inclusion of marginalized populations

- (1) There are three categories of age-based educational-inclusion programme.
- (2) For each age-based category, there are one or more programmes.
- (3) For each programme, there may be one to three forms of programmatic efforts.
- (4) Each programmatic effort is associated with a set of cost items and a total cost (sum of cost items) for that effort. The total cost for a programme is the sum of the total costs of the programmatic efforts. The total cost of a category of educational-inclusion programmes is the sum of the total costs of the programmes in that category. The total cost of educational inclusion is the sum of the total costs of the three categories of educational-inclusion programmes.

The definition of costs, the measurement and the classification of different cost items for a programmatic effort or programme, as well as the estimation of the total cost of a programmatic effort or programme are discussed in the next chapter.

Chapter II. Methodologies of cost analysis

This chapter discusses the terminology, concepts, methods, and procedures in the cost analysis of educational inclusion of marginalized populations. The discussion is focused on three areas: (1) the definition and classification of costs, (2) information collection for cost estimation, and (3) three major cost-related tasks (cost estimation, cost projection, and analysis of resource utilization) for planners of educational inclusion.

2.1 Costs of educational inclusion programmes

2.1.1 Definition of costs

The costs (or 'economic or opportunity' costs) of an educational inclusion programme are defined as the economic value of the resources or inputs used in the production of the programme; and the economic value of an input to a programme is measured in terms of its worth in its best alternative use. The total cost of a programme is the sum of the costs of all the inputs used in the production of the programme. For example, the costs of primary schooling consist of the economic value of the services provided by teachers, administrators, and other school personnel, pupils' time, school supplies, equipment, buildings and other facilities, etc. The total cost of primary schooling is the sum of the economic value of these different inputs.

A number of observations should be made regarding the above definition of costs. First, while the costs of some inputs may be measured in terms of the expenditures on such inputs (such as expenditures on teachers and expenditures on school supplies), costs

are not equivalent to expenditures in general. Costs refer not only to the actual expenditures made on the inputs, they also include the value of donated/free inputs (such as contributed equipment and labour in the construction of a school building), as well as the 'indirect' costs such as participants' (young children, children and youth, or adults, depending on the category of educational-inclusion programmes) time or the time of volunteers involved in providing an educational programme. Thus the cost of a primary school may consist of the formal expenditures made on the school plus the value of the resources (such as labour and materials) contributed by the community to school construction. These non-expenditure related costs should be carefully identified and measured; the failure to do so may lead to a significant underestimation of the total cost of a programme.

Second, the costs of a government programme include not only the resources devoted by the government, but also the resources devoted by the non-government or private sources. These private resources exist in three categories. The first consists of the expenditures by parents or participants on education (known as direct private costs), such as private spending on tuition and other school or programme fees, writing supplies, textbooks and other learning materials, uniform, as well as additional spending on food, lodging (for boarding schools), and transportation. The second category consists of the pupil's or participant's time (known as indirect private costs) and is measured by the economic value of the opportunities foregone (such as doing household chores, helping in agricultural production, or other employment activities). The third category consists of the contributions by parents, other community members, community organizations, and other organizations in the private sector to the school or a programme. Such contributions can be in cash or in kind.

Even though private resources are costs not borne by the government, government planners do need to understand the magnitude of these private costs and their impact on educational inclusion. For example, data from a number of countries show that private costs may account for one-quarter to one-third of the total cost of primary schooling. Private resources are thus a significant source in the financing of primary schooling (Tsang, 1994a). Also, parents may not enrol their children in school because they cannot

bear the excessive burden of school fees and textbook costs and/or they need their children's labour in household production. Thus the government may have to reduce or eliminate school fees and provide free textbooks to children from marginalized backgrounds in order to encourage parents to enrol their children in school. These additional government costs related to marginalized children have to be properly analyzed by planners. In many countries, especially low-income ones, the community is a significant contributor to primary schooling, especially with respect to school construction. The planner has to assess properly the ability and variation of communities in their contribution to educational inclusion.

Third, a distinction has to be made between costs and financing. Costs refer to the amount of resources required for a given programme while financing refers to how resources are obtained to pay for the programme. In other words, cost estimation determines *how much* is required for a programme while financing deals with *who pays* for the programme.

2.1.2 Classification of costs

In analyzing the costs of educational inclusion programmes, a number of common distinctions are made between different types of costs, such as the distinction between public costs, private costs, and social costs, between direct costs and indirect costs, between direct private costs and indirect private costs, between personnel costs and non-personnel costs, between recurrent (or operation) costs and capital (or development) costs, between institutional costs and individual costs, and between domestic costs and external costs (see *Table 2.1* for elaboration). Cost classification provides a convenient way to identify and label the different types of costs involved in educational inclusion.

For a variety of planning, budgeting, and resource allocation purposes, the different categories of education costs exist under a broader classification scheme. There exists no standardized classification scheme across countries because of differences in the types of programmes offered, the modes of delivery of educational programmes, sponsorship, and country-specific factors.

Cost analysis of educational inclusion of marginalized populations

Table 2.1 Types of costs of educational inclusion

Type	Explanation
• Public costs	Costs borne by government
• Private costs	Costs borne by participants and their families
• Social costs	Costs borne by society (total of public and private costs)
• Direct costs	Costs that represent direct outlay by the government, and by participants and their families
• Indirect costs	Costs that are not direct outlay but represent foregone opportunities (such as foregone earnings)
• Personnel costs	Costs of teachers/instructors, administrators, and other staff used in educational production
• Non-personnel costs	Costs of supplies, utilities, minor repair and regular maintenance, and other non-personnel items used in educational production
• Recurrent or operational cost	Costs of education inputs whose services last for one year or less
• Capital or development costs	Costs of education inputs whose services last for more than one year
• Institutional costs	Costs incurred by educational institutions consist of recurrent costs and capital costs by institutions
• Domestic costs	Costs borne by a country
• External costs	Cost borne by agencies from outside the country

However, for educational-inclusion programmes, one of three classification schemes may be considered.

The first scheme classifies costs according to the types of input to education. *Table 2.2a* provides an example of an input-based scheme for educational inclusion programmes. For each programme, costs are divided into two broad categories, recurrent (operating) costs, and capital (development) costs. Recurrent costs are grouped into two sub-categories: personnel and non-personnel costs. Personnel costs consist of the costs of teachers or instructors, educational administrators, and other staff. These personnel costs may be further distinguished into the costs related to basic salaries, employment benefits, supplemental benefits, and other personnel-related expenses. Non-personnel costs are the costs associated with school or programme supplies, regular maintenance and minor repairs, utilities, and pupil welfare (meals, scholarships/subsidies, etc.). Capital costs are costs associated with the use of buildings, land, equipment, and other programme-related facilities. The input-based scheme is a simple scheme in common use, and it provides the basic information for planning the costs of educational inclusion.

The second scheme classifies costs according to both the types of input and the sources of financing of input. Thus, for each educational-inclusion programme, there is a matrix of costs (see *Table 2.2b*). The sources of financing may include different levels of government (central/federal, state/provincial, and local/county/city), parents/households, the private sector (business, community and other non-government organizations, foundations, etc.), and external aid (bilateral, and multilateral). Compared to the first, this scheme provides additional information on how the various types of input are financed and thus is more useful for financial management and evaluation. Obviously, it is a more elaborate scheme and requires more information and effort to implement.

Cost analysis of educational inclusion of marginalized populations

Table 2.2 Schemes for classifying the costs of educational-inclusion programmes

2.2a Input-based only

	Programme 1	Programme 2	...	Programme N
Recurrent costs				
Personnel				
.				
.				
Nonpersonnel				
.				
.				
Capital costs				
Building				
Equipment				
Land				

2.2b Input by financial source

	Programme 1 Financial sources 1 2 ... S	Programme 2 Financial sources 1 2 ... S	...	Programme N Financial sources 1 2 ... S
Recurrent costs				
Personnel				
.				
.				
Nonpersonnel				
.				
.				
Capital costs				
Building				
Equipment				
Land				

2.2c Input by function

	Programme 1 Function 1 2 ... X	Programme 2 Function 1 2 ... Y	...	Programme N Function 1 2 ... Z
Recurrent costs				
Personnel				
.				
.				
Nonpersonnel				
.				
.				
Capital costs				
Building				
Equipment				
Land				

The third scheme classifies costs according to both the types of input and the functions of input. For each educational-inclusion programme, there is again a matrix of costs (see *Table 2.2c*). The list of functions may vary according to the type of educational-inclusion programmes. For example, the list of functions may consist of instruction, administration, general maintenance, food and dormitory services, and others. For an adult basic literacy programme, the list may consist of programme development, operation, programme evaluation, etc. For a distance-education programme, the list may consist of functions related to production, distribution, and reception. Compared to the first, this scheme provides additional information on the functions each type of input serves and the costs associated with each programme function. It is useful for understanding what resources are used for what purposes in a programme. Again, it requires more information and greater effort to implement.

The first scheme is the most basic or minimal scheme that should be used in analyzing the costs of educational-inclusion programmes. The implementation of the other two schemes depend on the availability of data and the capacity of planning agencies to collect and process additional information.

2.1.3 Why are costs of educational inclusion different?

The informational requirements for estimating the costs of educational-inclusion programmes are likely to be more demanding than those for formal schooling for non-marginalized populations. This difference is primarily due to the diversity of programmes for educational inclusion discussed above. Such programmes serve not only children and youth at the basic-schooling level, but also pre-school children in early childhood programmes, youth in compensatory or second-chance programmes, and adults in basic literacy programmes. They include not only programmes administered by educational ministries or departments, but also educational programmes run by non-education ministries and departments, and nutrition, health, and social-service programmes that provide or support educational inclusion. And both traditional and non-traditional learning strategies are necessary to deal with different settings (such

as rural or remote areas as opposed to urban areas) and/or different audiences.

In addition, the public cost of educating a marginalized child is likely to be more expensive than that for a non-marginalized child, because of the settings and disadvantaged conditions faced by the marginalized child. The differences in cost-per-child can be traced to differences in educational inputs and educational processes.

There are two common differences in educational inputs. First, the prices of inputs may be higher for the marginalized child. For example, the government may have to provide a higher compensation (such as giving 'hardship'-related supplemental benefits) to teachers working in rural or remote or mountainous areas. The cost of a school building may be higher in marginalized areas because of additional costs related to transportation of construction materials. Second, additional inputs may be required for marginalized children. For example, in order to attract female teachers to teach girls from certain minority or cultural backgrounds, boarding facilities may have to be provided. In rural or remote areas, boarding facilities may have to be provided to pupils from far-away places. In some societies, separate schooling is provided for boys and girls, and girls' schools usually have an extra wall surrounding the school for security purposes. Finally, to relieve poor households of the economic burden of the costs of textbooks and other school fees, free textbooks and reduction of or exemption from school fees are often necessary.

The educational process may also have to be different for marginalized children. First, marginalized children may require additional support to compensate for home and earlier school deprivations. For example, they may need additional nutrition or health-related services to support their learning in school; they may also need some peer tutoring to assist in their academic progress. Second, because of sparse population, schools in rural or remote or mountainous areas are usually smaller and have smaller class size and lower pupil-to-teacher ratio than schools in other areas; such schools thus have higher costs-per-pupil than other schools. Third, teachers may have to engage in multi-grade teaching or have to deal with pupils from very different cultural backgrounds. These teachers have to receive training to provide effective instruction

under these situations. Existing instructional materials may also have to be revised.

In other words, equal government expenditure on basic education for all children inevitably will result in different educational experiences for marginalized children and non-marginalized children. An equal educational experience for all children requires a higher government expenditure on marginalized children. Educational inclusion for all children requires that the elements of a 'package' of basic education experiences for all children be first identified and that the costs of this package of educational experiences be estimated for marginalized children.

2.2 Collecting information on marginalized populations

To estimate the costs of educational inclusion of marginalized populations, the planner needs information on both the demand for educational-inclusion programmes and the supply of educational-inclusion programmes (thus defining the gap for the educational-inclusion effort). Appropriate data collection methods then may be used to collect missing but necessary information.

2.2.1 Identifying informational needs

Information needs on educational-inclusion programmes can be conveniently divided into three categories: information on early childhood programmes (say, for children before the age of five or six), information on programmes for children and youth (say, between ages six and eighteen), and information on programmes for adults (say, between ages nineteen and fifty-five).

Table 2.3 gives an example of the nature of information that may exist on the demand for and supply of the three categories of educational-inclusion programmes. In general, the information will be used for the following: (i) determining the demand for programmes now and in the next few years; (ii) estimating and projecting the costs of providing the programmes; (iii) analyzing how resources are utilized in these programmes; (iv) developing indicators for monitoring changes and assessing progress in educational-inclusion; and (v) conducting policy studies on educational

Cost analysis of educational inclusion of marginalized populations

inclusion concerning economic evaluation, financing, and cost containment.

Table 2.3 Informational needs for educational inclusion

	Early childhood programmes	Programmes for children and youth	Programmes for adults
Demand side (current and projected) Total population Marginalized population Distribution of marginalized population			
Supply side (past and current) Characteristics of programmes (norms/standards, design features, prices of inputs) Enrolment (total, and for marginalized population) Costs (input based or input by financing; government and private expenditures)			

The choice of these information items will become more apparent in subsequent chapters which make use of such information in a number of applications of cost analysis.

On the demand side, one needs to know the total population (both marginalized and non-marginalized), the size of the total marginalized population, and the distribution of the marginalized population by age groups and across some set of background characteristics. The background characteristics (such as urban/rural regions, remote/mountainous/nomadic regions, male/female groups, ethnic/racial groups, cultural/religious groups) are selected on the basis of their relevance in identifying marginalized populations and their impact on educational costs. Information on demographic projection of various population groups is also necessary.

On the supply side, one needs information on the characteristics of programmes (including prices of inputs used in the production of such programmes), on past and current enrolments (past five years to now, if available), on the past and present distribution of enrolments by the same set of background characteristics selected for the demand side, and on the past and present public and private expenditures on these programmes. The characteristics of programmes refer to standards, norms, or design features that enable an estimation of the cost of inclusion per participant. The enrolment information should provide figures on marginalized populations; it may also include figures for non-marginalized populations. If an input-based cost classification is used, information on both government and private expenditures should be provided. Subject to data availability, the cost classification based on both input types and financing sources is preferred.

An important consideration in specifying the information needs is the unit of data analysis. Assume that the primary audiences of this discussion are educational planners at the national/central and provincial/state levels. Then an appropriate unit for the information in *Table 2.3* will be the local unit (such as a county, a city, or a district) immediately below the provincial/state level. Thus a three-level (national/central, provincial/state, and local) information hierarchy can be specified. At each level, data needs have a structure similar to that in *Table 2.3*. The data structures at the state/provincial level are based on an aggregation of those at the

local level; and the data structure at the central/national level is based on an aggregation of data structures at the state/provincial level. An application of this information hierarchy is the construction of a hierarchy of cost indicators among three levels of governments (see *Chapter IV*).

2.2.2 Information collection methods

This section presents a number of methods for collecting the information specified in *Table 2.3*. Since countries vary in their administrative practices, availability of data, and capacity for data collection, some modification of this illustration is necessary.

There are a number of commonly used criteria for designing or choosing methods for collecting information. These criteria include: (i) the necessary information can be collected; (ii) information collected is accurate, reliable, valid, and timely; (iii) information can be processed and reported in a timely manner; (iv) the cost of data collection is affordable; (v) the information collected is cost effective (that is, the cost of collecting information on an item is justified by the benefit of having the information on the item); and (vi) whenever possible, existing data collection instruments and procedures are used or adapted (Tsang, 1988; Ross and Mählck, 1990: (*Chapter V*)).

There are three major sources of data: *households, institutions or units* providing educational-inclusion services (such as centres providing pre-school services, primary schools, and adult literacy centres), and education and non-education units within the government. They correspond to three general strategies for collecting data on educational inclusion. For each strategy, data can be obtained either from all the data units (that is, a 'census' approach) or from a sub-sample of all the data units (a sampling approach).

Collecting information from households: households can be the source of information on educational attainment, socio-economic and other background information, and on private resources devoted to educational inclusion purposes. They are a very important informational source when there are significant proportions of various age groups not participating in basic education. A *population census* is a survey of all the households at a given point in

time. It is the most comprehensive in terms of the number of households involved; but because of this broad coverage, only rather general socio-economic, education, and family-related information can be gathered. It is costly to conduct; the processing of information is time-consuming and the reporting of findings cannot be accomplished in a short period of time. It is usually conducted only infrequently (once in ten or more years). Depending on the contents of the census survey, it may give information on the educational attainment of different groups of society. Such information can be used to identify the scope of educational inclusion and the backgrounds of the educationally marginalized. But such information can be estimated from a sampled survey of households, the population census will only be a supplemental informational source. In a *sampled household survey*, only a proportion of all the households is surveyed; the proportion is usually small (say 1 to 5 per cent) and is related to the level of estimation precision desired. Usually, the households will either be randomly selected (random sampling method) or identified through one or more stages of selection based on some criteria such as income level, or location/region, or other characteristics (multi-stage sampling method). Either way, the objective is to select a sample of households whose characteristics are representative of those of the entire population. Compared to the population census, the sampled household survey is less expensive to conduct; data processing and reporting are also faster; and more in-depth information can be obtained. To obtain information over time, the same sampled survey can be conducted periodically (say, once a year or once in three years, data collection cost is a key factor). Note that a sampled household survey can also be expensive to conduct when interviews are necessary to collect information from households with a high percentage of illiteracy. However, sampled household surveys have to be used when they are the only way to obtain accurate information about households that is not accessible from other sources of information. A substantial literature on sampling methodologies exists (Fowler, 1984; Kalton, 1983).

Collecting information from institutions or organizations that offer educational-inclusion services: the various institutions or organizations that offer such services usually have regularly compiled records (day-to-day, monthly, or annually) on their operations. Such records usually provide information on the supply side of educational inclusion, such as enrolment, programme characteristics, personnel information, some measures of pupil or participant performance, and budgetary data. Some subset of such information (especially on enrolment, personnel, and facilities) is reported to the relevant government departments or units on a regular basis (semi-annually or annually). For many countries, the government has the basic information on the quantitative aspect of educational inclusion; some will even have the input-based measures of educational quality (such as teacher qualification and training, physical conditions of schools). If the government does not have such basic quantitative and qualitative information, the information has to be obtained from institutions and organizations providing the educational-inclusion services. Information on other dimensions of educational quality (such as education process, and educational output in terms of achievement or dropout rates) usually has to be collected from institutions and other organizations providing the services. When information has to be collected from institutions and other organizations, a choice has to be made between a census approach and a sampling approach, and it generally depends on whether or not information is needed for all the institutions/organizations and on the costs of data collection. Note that this institutional strategy is useful only for collecting information on existing programmes and on population groups already participating in basic education. It is not useful when a significant proportion of the population groups are not in basic education and information is required of such populations; information on such populations may have to be collected from households or from the government.

Collecting information from the government: various departments or units within the government may have information on educational inclusion that is collected on a regular basis. For example, the departments or units dealing with pre-school education, basic schooling, and adult education usually have information

on enrolment and expenditures respectively for these educational services. Other non-education departments or units may also have information on early-childhood programmes for marginalized populations and literacy programmes for adults. Other non-education units that deal with population/demographic data are also relevant.

Consider the informational needs in *Table 2.3*. Typically (and subject to some modifications across countries), information on the demand for early childhood programmes and programmes for adults may be obtained from the government and/or from household surveys. Information on the demand for programmes for children and youth may be obtained from the government and schools; but sampled household surveys are necessary if a significant proportion of marginalized children and youth are not in school. For all three categories of programmes, information on programme characteristics and enrolments can be obtained from the government, and non-government operated institutions and organizations. Information on prices of education inputs may be obtained from the government or from institutions. Information on public expenditures is found in government records, and information on private expenditures is obtained through a sampled household survey. Information on items obtained through an established annual survey or report can provide data for constructing annual time series for such items. Information on some items (such as private educational expenditures) may be collected less frequently (say, once in three years); data interpolation and extrapolation are needed to generate annual time series for these items.

Data collection for educational inclusion of marginalized populations may be different from that for the general population for a number of reasons. *First*, information on many items pertains to marginalized populations only and not to the average population. There is thus a need to focus on and locate the marginalized populations. *Second*, there is generally less existing data on marginalized populations than the general population, thus requiring new data collection efforts for such populations. *Third*, because of remoteness or other factors, data collecting on marginalized populations may be more difficult and time consuming, and more costly. If data collection for marginalized populations is too

difficult or costly, some data items may have to be estimated for inclusion-costing purposes.

Assume that there is a unit within the government responsible for the planning of educational inclusion of marginalized populations. To collect the necessary information for educational inclusion, the unit may consider the following steps:

- Collect existing data from the government. This involves carefully identifying all the relevant government departments or units (both education and non-education ones) that regularly collect information pertinent to educational inclusion.
- Compare existing data with the data required. If there is an information gap, determine if the gap can be addressed by making adjustment to the existing data-collection forms used by the relevant government departments or units.
- If there is still an information gap, determine if it can be filled by data collection from institutions/organizations providing the educational-inclusion services. Use a sampling approach if it is not necessary to have information on all the institutions/organizations.
- Conduct a household survey if there is a gap in household information. Use a sampling approach whenever possible.
- If data collection is not feasible (either because it is too costly, or not cost-effective, or it is simply not practical to collect the necessary data), make estimates based on other indirect information or sensible assumptions.

To summarize, the procedure for identifying and collecting information for educational inclusion of marginalized populations is as follows:

- Define what educational inclusion means.
- Define measures on both the quantitative and qualitative aspects of educational inclusion; define procedure for identifying the educationally marginalized. Use indicators to assess and monitor educational inclusion over time.

- Identify/specify all the relevant educational inclusion programmes for pre-schoolers, children and youth, and adults.
- Specify the cost classification scheme(s) for the three categories of educational inclusion programmes. As a minimum, use the scheme based on input type.
- Specify the informational needs for educational inclusion.
- Determine the methods and procedure for collecting information on educational inclusion.

With the necessary information, the planner can undertake the three major cost-related tasks discussed in the remainder of this chapter.

2.3 Estimating the costs of educational inclusion

Cost estimation is not a hard science and it is often undertaken with a degree of ambiguity. The ambiguity may arise because of a lack of relevant data, from uncertainty about the size and distribution of the population groups to be served, from uncertainty about the unit costs of supplying educational services, and from uncertainty in government policies and revenue in support of the educational services. The planner or cost analyst has to make informed judgement or assumptions to deal with the lack of information or other uncertainties. Nevertheless, methods and procedures do exist to guide the planner or cost analyst in arriving at reasonable and informed estimates of costs. For educational planners, there are two main approaches to estimating the costs of basic education programmes for marginalized populations: the aggregate approach, and the ingredients approach.

2.3.1 The aggregate approach to cost estimation

In the aggregate approach, the planner uses existing government budgetary data to estimate the unit costs (such as costs per participant) of a programme. Such data are often available in an aggregate form and the unit costs are obtained by dividing total educational expenditure by the number of participants. The procedure consists of two steps: first determine the unit costs for

the average participant, and second, make necessary adjustments to these unit costs in order to arrive at the unit costs for marginalized populations. This procedure draws upon data on the supply side in *Table 2.3*.

Typically, the first step consists of estimating the unit recurrent and capital costs of an education programme for the average participant. Consider, for example, the per-pupil recurrent cost and per-pupil capital cost of primary schooling for the average pupil. Assume that a total of X dollars of recurrent expenditure was spent by the government last year on primary schooling with Y pupils; then, for the government the total recurrent cost per pupil for primary schooling is X/Y dollars per pupil, based on last year's prices. A number of observations and modifications can be made about this step:

- (1) The recurrent expenditure should refer to *actual* expenditure, not *planned* allocation.
- (2) The per-pupil recurrent public cost for last year (or a previous year) should be adjusted for changes in the prices of recurrent education inputs to obtain the per-pupil recurrent public cost for the current and future years (price adjustment is discussed *Section 2.4*).
- (3) Sometimes, data on some items or categories of recurrent government expenditure are not available, such as data on non-personnel inputs or the central/federal or provincial/state expenditure on the administration of the primary-schooling system. In this case, the unit recurrent public cost can be estimated by making an assumption about the ratio of non-personnel cost or system-related administrative cost to the total recurrent public cost. For example, non-personnel cost may equal 5 to 10 per cent of the total recurrent public cost; and system-administrative cost may equal 5 per cent of government expenditure on teachers.
- (4) It is important to have accurate data on government expenditure on the personnel category (and especially on teachers) because personnel costs often constitute the bulk of recurrent costs in education. For primary schooling, personnel costs may account for over 90 per cent of the total recurrent expenditure made by the government.

In some situations, personnel costs are lumped together for more than one level of schooling, for example, for primary and secondary schooling together. In that case, information on the number, qualifications, and experience of teacher and other personnel for both levels of schooling is necessary in order to separate the personnel costs between the two levels. If no good data exist for government expenditure on teachers in primary school, the ingredients approach (discussed below) should be used instead.

- (5) Make sure that the recurrent expenditures by different levels of government, net of intergovernmental transfers in recurrent funds, are used in calculating the total recurrent expenditure. Failure to take account of recurrent expenditures by lower levels of government can lead to a significant underestimation of the recurrent cost per pupil. In some countries, data on recurrent expenditures by non-central government units may not be available. If such expenditures are substantial relative to those of the central government, the use of the aggregate approach is very problematic.
- (6) If other non-education units in the government also spend on recurrent expenditure on primary education, then such expenditure should also be included in the total recurrent expenditure on primary education.
- (7) Note that the aggregate approach provides an estimate of the recurrent expenditure per pupil by the government. It does not consider private resources and thus does not estimate the total or social cost per pupil.

For per-pupil capital cost of primary schooling, the estimate cannot be based on capital expenditure by the government on primary schooling during the previous year. This is because government capital expenditure usually fluctuates over time; capital expenditure in a previous year may depart substantially from the average capital expenditure over a period of five to ten years. Second, a capital good lasts for more than one year; the annual cost of the finance of a capital good is only a fraction of the total capital expenditure on that item. For example, equipment may last for five

years, while buildings may last for twenty to fifty years (depending on the type of construction).

Within the central department or ministry of education in many countries, there are usually units dealing with the purchase of school equipment and with the construction of school buildings. Such units should have information on the costs of a list of common equipment used in school and on the unit costs (such as cost per square meter or cost per classroom) on some common models of school construction (especially schools in urban areas or schools attended by non-marginalized populations). An estimate of the total capital cost of a given school model (sum of costs of school facilities and equipment) can be obtained; and one can obtain the total capital cost per pupil (or per classroom) by dividing the total capital cost of the school by the pupil capacity (or number of classrooms). The total capital cost per pupil or per classroom gives the magnitude of the total capital cost required over the life span of the school on a per pupil or per classroom basis. If no such estimates of unit capital costs currently exist, then it is better to use the ingredients approach.

For various planning purposes, one also needs estimates on the *flow* of capital investment over time, that is, how much capital cost is incurred each year. The cost per pupil per year for a capital good can be determined by using an *annualization method*. According to this method, the total capital cost per pupil per year for each year over the life span of the item is equal to the *replacement cost* per pupil of the item multiplied by an annualization factor. The replacement cost of a school building is the cost to replace the schooling building in its present condition. If the school building is new, then the replacement cost equals its construction cost; if the school building is old, its replacement value will be lower than the construction cost and has to be assessed in terms of its market value. The annualization factor (say, AF) depends on both the length of the life of the item (say, t years) and on a discount rate (say, r per cent); it takes into account both the depreciation of the item over time and the economic opportunity foregone (for example, interest that could have been earned on the original investment in the capital good) for the capital good. The mathematical formula for computing AF is as follows:

$$AF = r(1+r)^t / ((1+r)^t - 1)$$

For example, if r is 10 per cent and t is 5 years, then AF is .264; AF is .130 when r is 5 per cent and t is 10 years. The annualization factor is larger when the discount rate is higher and the life span is shorter.

The value ' t ' may be determined from actual usage or from information supplied by the producer. The value ' r ' depends on the rate of return to capital of similar character to the item. A benchmark value of 10 per cent is often assumed for the average rate of return to capital. However, planners and analysts may disagree on the appropriate estimate for the discount rate because of uncertainty in the future in capital investment. As an alternative to a single estimation, three annualized capital cost estimates can be made, one based on the 'most probable or average' value of r , the second based on a low-estimate of r , and the third based on a high-estimate of r . The financial implications (such as financial feasibility) of the three estimates can be subsequently assessed. The use of multiple estimates also provides a test of the sensitivity of estimates to specific assumptions about the discount rates.

If information on the cost of a capital item is currently not available, the planner is advised to work with the equipment or school-construction unit to estimate the cost using the ingredients approach. Alternatively, the cost of the item may be estimated by making an assumption about the cost relative to some other capital item for which cost information is available. For example, if the cost of school construction is known while the cost of equipment is not known, then the cost of equipment may be assumed to be some proportion of the cost of school construction. Obviously, the proportion varies with the level of schooling or the type of programme and should be based on other information, if available.

Information on capital expenditure is usually harder to come by compared to information on recurrent expenditure. Sometimes, in the aggregate approach, a planner may have to estimate per-pupil capital cost on the basis of per-pupil recurrent cost by making an assumption about the ratio of the two cost categories. This may be necessary when a quick but approximate estimation is needed. Obviously, the precision level of this estimation can be very problematic; an ingredients approach is preferred, especially when time is not a severe constraint.

Assume that estimates of the per-pupil recurrent cost and per-pupil capital cost of primary schooling for the average or non-marginalized population are available. The second step is to adjust these estimates to take account of the schooling factors that pertain to marginalized children. Adjustment can be made for each major group of marginalized populations (rural children, girls, certain minority group, etc.). Analytically, the per-pupil recurrent cost (or capital cost) for a marginalized group (say, for girls) or a marginalized context (say, primary schooling in rural/remote area) is equal to the per-pupil recurrent cost (capital cost) for the average/non-marginalized population times a cost adjustment factor for that group or context. From these calculations, a table of new unit costs can be developed (see *Table 2.4a*).

The size of the cost adjustment factor will likely vary across marginalized groups and contexts and across levels of schooling or types of programme; the adjustment factor for each marginalizing condition has to be estimated separately.

As discussed in the previous Section, the unit costs of education for marginalized populations are likely to be higher than those for non-marginalized populations; this results from a combination of higher costs associated with educational inputs and process. In the aggregate approach, an important task is to identify the additional costs associated with a marginalized group or context. The cost adjustment factors are likely to be greater than unity, unless an inferior quality of education is meant for marginalized children. For example, in providing primary schooling to children in a remote area, the per-pupil personnel cost may be higher as a result of several factors including a higher compensation for teachers (hardship supplemental benefits) and a smaller class size; the per-pupil capital cost may also be higher as a result of a smaller class size and a higher cost of construction per square meter or per classroom (due to materials transportation cost). To put it differently, a lower-cost education for such children is not really less expensive but is simply a poorer-quality education.

Table 2.4 Per-pupil costs of educational inclusion programmes

2.4a Aggregate approach

	Per pupil recurrent cost to government	Per pupil capital cost to government
Early childhood programmes		
Programme 1		
Programme 2		
•		
•		
•		
Programmes for children/youth		
Programme 1		
Programme 2		
•		
•		
•		
Programmes for adults		
Programme 1		
Programme 2		
•		
•		
•		

2.4b Ingredients approach

	Recurrent cost			Capital cost		
	Per pupil cost (total)	Per pupil cost to government	Per pupil cost to participant/family	Per pupil cost (total)	Per pupil cost to government	Per pupil cost to family/community
Early childhood programmes						
Programme 1						
Programme 2						
•						
•						
•						
Programmes for children/youth						
Programme 1						
Programme 2						
•						
•						
•						
Programmes for adults						
Programme 1						
Programme 2						
•						
•						
•						

As an illustration, assume that the average per-pupil recurrent cost is US\$300 per pupil and is based on an average pupil to teacher ratio of 25 to 1 for the current pupil population. To provide a new school in a rural area, it is estimated that the average pupil to teacher ratio will drop to 20 to 1. Thus, the cost adjustment factor for providing primary schooling in rural areas is 1.25 and the corresponding per-pupil recurrent cost is US\$375. If providing primary schooling in remote rural areas requires an additional 5 per cent increase in personnel cost and personnel cost accounts for 90 per cent of recurrent cost, then the cost adjustment factor for remote rural schools (with 20 pupils per teacher) is 1.31 $((1 + .05 \times .9) \times 1.25)$ and the corresponding per-pupil recurrent cost is US\$393.

As another illustration, assume that the per-pupil capital cost for a boys school is US\$1,000 in a typical urban area. The per-pupil capital cost for a girls school in a remote rural area may involve three cost adjustments: a drop in pupil to teacher ratio from 25 to 20, an increase in construction cost due to additional transportation cost (say, 5 per cent of the base cost), and an increase in construction cost due to the addition of a school wall, a school gate, and boarding facilities for female teachers (say, 15 per cent of the base cost). The resultant cost adjustment factor is 1.5 $(25/20 \times (1 + .05 + .15))$ and the per-pupil capital cost is US\$1,500.

Note that the second step in the aggregate method is not problematic if the cost adjustment is a marginal to moderate adjustment to the base case for the average pupil population. If there are many adjustments to be made or if the new school is very different from the average school, then it is advisable to obtain a new estimate based on the ingredients method.

The above examples apply to the estimation of the per-pupil recurrent and capital cost for the government for providing primary schooling to marginalized children. The same procedure can be adopted for secondary schooling, early childhood programmes, and adult literacy programmes. For early childhood programmes and adult literacy programmes (Tsang, 1994b), the following adjustment to the above procedure may be required:

- If the early childhood programmes and adult literacy programmes are already targeted at marginalized popula-

tions, the second step in the above procedure is not necessary.

- Cost partitioning is needed to deal with the existence of *joint production*. In some countries, adult (or early childhood) programmes are operated as one of several functions of a department. The personnel involved in an adult programme also have other tasks not related to adult training; that is, they do not spend their full time on an adult programme. Similar, the facilities employed for adult training are also used in other ways. It is thus not proper to charge the full cost of the personnel and facilities to the recurrent expense and capital expense of adult training respectively. To properly account for the costs of the personnel and the facilities in providing an adult programme, one needs information on the proportion of time devoted to the adult programme by the personnel and the facilities. Thus, for example, if the personnel devote only 30 per cent time on adult training, the personnel cost of adult training will equal total personnel expenditure multiplied by .3. In some situations, adult training is only a secondary or peripheral function of a department, the relevant recurrent and capital expenditures do not appear under adult training and are charged to the primary function of the department. And there often is no information to account properly for the utilization of resources on adult training. In this case, the aggregate approach cannot be used.
- Cost estimation needs to take account of *donated resources*. Many adult programmes, especially community-based ones, are operated with significant contributions from non-government sources, such as volunteers' time, as well as donated materials, equipment, and or facilities. Such private resources are usually not found in the government record. The per-participant recurrent cost and capital cost based on government expenditure will substantially underestimate the real economic costs of adult training. This deficiency of the aggregate approach also applies to primary and secondary schooling. The

aggregate approach needs to be supplemented with estimates of private resources based on data from households or institutions (see supply-side information in *Table 2.3*).

The advantage of the aggregate approach consists in the use of existing data; thus it is usually less costly to undertake and requires less time to obtain cost estimates. But it also has significant limitations which often will make the ingredients approach preferable. First, the available data may be incomplete and/or inaccurate. There may not be enough existing data to make informed assumptions; thus, the cost estimates may be imprecise. Second, as indicated above, government budgetary data do not provide information on private resources. This information is critical when private resources constitute a substantial proportion of the total cost. Third, the conditions of basic education for marginalized populations may be very different from those for the average (or non-marginalized) populations so that the unit costs for marginalized populations may not be easily obtained by making some simple adjustment to the unit costs for the present population (as is done in the two-step procedure). In other words, it is necessary to estimate unit costs for marginalized populations by directly focusing on the characteristics of basic education for such populations. Fourth, the aggregate approach is based on existing data for existing programmes. Basic education programmes for marginalized populations that differ substantially in content or procedures cannot be costed using the aggregate approach.

2.3.2 The ingredients approach to cost estimation

The ingredients approach is a disaggregated approach based on individual inputs or resources (ingredients) used in the production of an educational programme (Levin, 1983). In estimating the total cost of a programme, the approach consists of three steps: (i) identifying all the ingredients used in the production of an educational programme; (ii) estimating the cost of each ingredient; and (iii) summing individual costs to obtain the total cost of the programme. To determine the total cost to the government, a fourth step to identify the financing sources is necessary.

In the first step, it is important to identify *all* the ingredients used in a programme. If a major ingredient is omitted, the total cost estimated will likely be substantially underestimated. An input is included as an ingredient as long as it is used in some way in the production of the programme, regardless of the sources of financing. In practical terms, both ingredients used in an educational institution and financed by the government and those financed by the pupils (or their parents) or other participants are included. Thus, in contrast to the aggregate approach, the ingredients approach explicitly recognizes privately-supported input to basic education. This step also specifies the quantity (e.g., number of teachers) and quality (teacher qualification) of each ingredient.

The second step estimates the cost associated with each ingredient. For a given one, the cost is equal to the quantity (number of units) of the ingredient times the price of the ingredient (*cost per unit of ingredient with the specified quality*). For those paid for by the government, the necessary price information (such as the salary schedules for teachers, administrators, and other staff; construction cost per square meter; prices of equipments and supplies, etc.) is readily available. Note that the price of an ingredient should be that particular price necessary to utilize it in the particular setting concerned. For example, the cost of a teacher working in a remote area is the total compensation paid to a teacher working in a remote area; this cost may be different from the average compensation of teachers in a country. Sometimes, the price of an ingredient has to be estimated; for example, the price of a volunteer's time. This price is dependent on the nature of tasks performed by the volunteer and not necessarily dependent on the qualifications of the volunteer. If there is significant uncertainty in estimating the price of an ingredient, then a range of estimates ('average', 'low', and 'high') can be provided to depict alternative assumptions or scenarios. For countries who employ both domestic teachers and expatriate teachers, two sets of salary schedules apply. Expatriate teachers are generally very expensive but the country may receive some subsidy from the expatriating country. The planner should determine the cost of an expatriate teacher to the country.

For ingredients paid for by the pupil (such as school uniforms, writing supplies, textbooks or other learning materials, if relevant, etc.), the direct private costs have to be estimated from a sample survey of parents, pupils, or other school personnel. A quick way to obtain an approximate estimate of such costs is to survey some institutional administrators (such as school principals and programme coordinators). The indirect private costs of basic education also have to be estimated. In general, indirect private costs are the economic value of the foregone opportunities of basic education. For preschool children, indirect private costs may be assumed to be zero. In most cases, the indirect private costs of primary schooling (and lower-secondary schooling) may be assumed to be zero or negligible. However, in some countries, indirect private costs may be non-trivial because children, especially females, have to participate in family production and do household chores. Such costs cannot be readily estimated because there are no competitive markets for such child labour. Some explicit assumptions have to be made to establish a price (known as 'shadow price') on such child labour. For adults, indirect private costs are estimated to be the earnings foregone. The earnings foregone depend on the wage rate, the rate of employment, and the amount of time spent in the adult literacy programme.

Finally, if an ingredient (such as school buildings and equipment) lasts for more than one year and its annual cost estimate is needed, its cost should be annualized, based on appropriate assumptions about the discount rate and the length of service of the ingredient. If a school building/space or equipment is rented, then the annual cost of the school building/space or equipment is equal to the annual rental cost.

The third step is a straightforward summation of individual costs. To enhance the overall precision of the estimation of the total cost of a programme, it is especially important to estimate accurately the costs of the major ingredients in the second step. Since personnel costs usually account for a major portion of the total recurrent cost, they need to be estimated most carefully. Sometimes, for purposes of simplicity and convenience, non-personnel costs are estimated as a proportion of personnel costs; this underscores the importance of accurately estimating the personnel costs. The total cost of a programme (or programmatic

effort) refers to the total resources devoted to the programme (or programmatic effort); it consists of the resources devoted by both government and non-government sources. If a range of estimates is provided in step two, then a range of total-cost estimates will be obtained in step three. The latter will show how the total cost varies with alternative assumptions made in the previous step.

For planning purposes, the public costs of a programme usually are of more immediate concern to educational planners. To determine the total cost of a programme to the government, one returns to the list of ingredients identified in step one and determines the sources of financing for each ingredient. As discussed previously, these sources can be divided into two broad categories: government sources and non-government sources. Note that total government cost equals to the sum of government costs at various levels minus transfer payments among governments. The total cost of a programme equals the sum of total government cost and total private cost minus the transfer of resources between the two (e.g., school or programme fees paid by pupils or participants to the government, and government subsidies to pupils or participants). For some countries, external aids to education may be a significant financial source for educational inclusion; a distinction between domestic resources and external resources may have to be made.

The ingredients approach can be used to estimate the per-pupil total recurrent cost and per-pupil total capital cost of *each* educational-inclusion programme or programmatic effort. For example, one can generate a unit cost table such as that illustrated in *Table 2.4b*. In *Table 2.4b*, three measures of unit costs are provided for recurrent cost and for capital cost: the cost to the government, the cost to the participant or community, and the cost to society (total cost). The basic information need is a detailed description of the ingredients used in each programme and the prices of ingredients (see *Table 2.3*). Examples of cost estimation applying the ingredients approach are given in *Chapter III* (see *Examples 3.1-3.4*).

2.3.3 *Total costs and unit costs*

For purposes of costing and comparing, the costs of educational inclusion programmes are often expressed on a per-unit basis, as discussed in the two approaches of costing. Very often, the participant is used as the unit of analysis. There are also other units of costing that the planner will encounter, such as costs per hour, costs per class, and costs per graduate. The per-hour unit is used when the programmes are very diverse and are of different length. The per-class unit is used when the planning is based on the number of classes of primary schooling or secondary school to be offered. The per-graduate unit may be used in addition to the per-pupil analysis when there is a significant repetition or dropout rate in schooling; in some countries, the cost per primary-school graduate from a six-year cycle may be eight to ten times (or even more) of the cost per primary-school pupil per year.

A distinction should be made between *average cost* and *marginal cost*. Average cost is equal to the total cost of a programme divided by the total number of output units of the programme. Since the output of an educational programme is diverse and multidimensional (and some of the outputs may not be easily measured), the number of participants (or instructional hours) served by the programme is often used as a proxy. Thus, *average cost* is often expressed as a unit cost of total cost per participant. In the examples provided above, the unit costs are all examples of average costs. Average costs are appropriate for the planning of new programmes, or the expansion of existing programmes.

Marginal cost is the cost of producing one additional unit of output. Also, using the number of participants as a proxy for the number of output units, *marginal cost* is often expressed as the cost to service one more participant beyond the existing population served. Marginal cost is also a unit cost.

Thus average cost and marginal cost refer to different measures of unit cost. They may or may not be equal in value. For example, if the total recurrent cost of a new six-classroom school serving 120 pupils is US\$17,730; thus the average recurrent cost per pupil is US\$148, for a rural area without a primary school. In a nearby rural area, there may be an existing primary school with underfilled classes. This school can accommodate one additional

pupil without hiring additional personnel. In other words, the additional recurrent cost of having another pupil is likely to be much lower than US\$148. Similarly, the marginal per-pupil capital cost will be less than the average per-pupil capital cost. In general, marginal cost is less than average cost when there is underutilization of existing resources. With respect to planning educational inclusion for marginalized population, it is important to determine the utilization of existing resources. It is less costly to serve additional pupils by taking advantage of unfilled capacity in existing schools. Sometimes, an additional classroom and an additional teacher may be added to an existing school to meet the increase in the pupil population.

For planning purposes, a *resource utilization survey* can be conducted of all the existing schools. The survey will find out information about actual class size, teaching load, and how often school facilities (classrooms, activity rooms, and laboratories, if applicable) are utilized in a week. In many countries, a school has to fill out and submit an annual report to a local administrative unit; the items on resource utilization can be added to this annual report. If no annual reporting exists, the resource utilization survey may have to be conducted periodically (say once in three years to control collection and processing costs). If the cost of a 'census' survey is deemed too costly or unmanageable, a sample survey can be used instead so that the planner still has an assessment of the potential of existing schools in accommodating additional pupils. If a country has an adequate educational management information system, the information on resource utilization in existing schools can subsequently be aggregated to the provincial/state and central/federal levels, to inform planning at these higher levels of government.

Besides the distinction between average cost and marginal cost, the planner should note that, for some programmes, unit costs (both average cost and marginal cost) will change with the scale or size of a programme. As will be pointed out in Example 3.3 in Chapter III, unit costs of distance education generally become less expensive as the scale of the programme is increased.

For a given marginalized group, there are generally three forms of educational-inclusion efforts at the programme level (see

Chapter 1). Correspondingly, there are three types of programmatic costs: costs of upgrading, costs of broadening access to similar groups, and costs of broadening access to new groups. For a given programme, the unit recurrent cost and unit capital cost of each of the three forms of inclusion effort have to be estimated.

The procedure for estimating the total cost of educational inclusion may be summarized in the following:

- Education inclusion consists of up to three age-based categories of programmes. Each category has one or more programmes and each programme has up to three programmatic efforts.
- Each programmatic effort is associated with a set of unit costs (such as per-pupil recurrent cost, per-pupil capital cost, and per-pupil total cost; or simply per-pupil total cost).
- For each programme effort, it is important to ask the question: cost to whom? To determine the total cost to the government, the set of unit costs should refer to the unit costs to the government. To determine the total cost to society, unit costs based on the total cost (from all sources) should be available.
- Unit costs may be estimated by either the aggregate approach or the ingredients approach. The aggregate approach generally provides unit cost estimates for the government only.
- The total cost of each programmatic effort is equal to the product of the quantity demanded (such as number of participants or number of training hours; see *Table 2.3*) for that programmatic effort and per unit total cost for that programmatic effort. The total cost for a programme is the sum of the total costs of the programmatic efforts. The total cost of a category of educational inclusion is the sum of the total costs of the programmes in that category. The total cost of educational inclusion is the sum of the total costs of the three categories of educational inclusion.

2.4 Projecting the costs of educational inclusion

The previous section discusses the methods for estimating the costs of educational inclusion programmes at a point in time, usually for the present time and for a period of one year. The planner, however, often has to estimate the costs of educational inclusion for a future time and for an extended period. To perform the cost projection, the planner requires information on future demand for educational-inclusion programmes and on the costs of supplying such programmes in the future.

Consider, for example, the task of estimating the costs of educational inclusion for the next five years. On the demand side, the planner needs information on the number of children, youth, and adults that require services from the three categories of educational-inclusion programmes respectively in each of the next five years. This information should be disaggregated (e.g., rural/urban, male/female, etc.) in such a way as to match the education-inclusion programmes.

There are standard methods for projecting the number and distribution of the population by age. The planner should consult the relevant population/demographic unit within the government to obtain the most recent population projection. The planner can subsequently conduct a cohort analysis to determine the flow of participants in various educational-inclusion programmes over the next five years.

The methods for projecting demand are found in the literature on planning and are not discussed here (Davis, 1980; Cuadra and Crouch, 1989). This section assumes that such demand information is available for cost projection. One cannot overemphasize, however, the importance of obtaining accurate projection of the demand for various educational-inclusion programmes in order to project the costs of educational inclusion accurately.

On the supply side, the planner has to estimate the recurrent costs and capital costs in each of the next five years. Consider recurrent costs first. In the aggregate approach, as indicated previously, the unit recurrent cost is obtained by dividing aggregate recurrent expenditure by the total number of participants. The unit

recurrent cost for each of the next five years can be obtained by adjusting the value of the most recent unit recurrent cost.

There are several possibilities for the adjustment, each based on different assumptions or scenarios. First, the unit recurrent cost may be assumed to increase at a rate equal to the average rate of growth in unit recurrent cost in the past five years; this adjustment utilizes historical information and assumes that the past will apply to the near future. Second, the unit recurrent cost may be assumed to grow at the same rate as real national income per capita (growth rate net of inflation). This assumes that either the productivity of recurrent inputs (such as teachers) rises at the average rate of the national economy and/or that such inputs do benefit from the productivity gain of the national economy. Third, the unit recurrent cost may be assumed to remain constant in real terms (purchasing power) in the next five years; that is, it will grow with the rate of inflation. This assumes that either the real growth of the economy is zero or that personnel recurrent inputs do not benefit from the productivity gain of the national economy. Fourth, unit recurrent cost may be assumed to increase at a rate higher than that for national income; this is not a common situation and may lead to a general rise in the price level of the economy. Which adjustment to make depends on the analyst's judgement about the most likely path for future costs. Such a decision should be informed by an analysis of what the future salary of teachers may be (see discussion below).

In the ingredients approach, projection of unit recurrent cost is obtained by identifying and costing all the ingredients of a programme. The unit recurrent cost of the programme in the future is obtained by adjusting the prices of the ingredients, and calculating the new ingredient costs, total cost and unit cost. The major task is estimating the prices of ingredients in the future. In general, the price of a non-personnel ingredient may be assumed to rise at the projected rate of inflation in the next five years. The projection of the prices of personnel inputs (teachers/instructors, administrators, and other support staff) requires careful analysis since personnel costs constitute the bulk of the total recurrent cost. In general, teacher compensation is affected by a number of factors, including the growth in national income, the rate of inflation, the shortage/surplus in the supply of teachers, the strength of teachers'

unions, probational and continuing certification requirements, etc. A change in one or more of these factors will likely lead to a change in the cost per teacher. In general, higher teacher compensation is associated with a higher rate of growth in national income, a higher rate of inflation, a shortage in teacher supply, more influential teachers' unions, and higher certification requirements. Depending on the cumulative effects of these factors, each one of the above four types of adjustment is possible. Again, the planner can perform multiple cost projections based on different assumptions about the growth in teacher costs.

For countries that employ expatriate teachers, careful projection of the number of expatriate teachers over time is necessary. For those countries which want to replace expatriate teachers with domestic teachers, an assessment of the supply of domestic teachers is necessary.

Next, consider capital costs. In the aggregate approach, the unit capital cost in future years is estimated by adjusting the unit capital cost of the most recent or base year. A common practice is to assume that unit capital cost will rise with the rate of inflation. In the ingredients approach, one has to adjust the price of each ingredient. Except for land prices, one can generally assume that the prices of other capital inputs will rise with the rate of inflation. The price of land may be quite stable or may rise sharply over time, and it should be estimated separately. The planner may consult the relevant construction and/or equipment supply units in the government to acquire information on how prices of capital inputs may change in the next five years.

The planner should also be aware of the connection between projected capital costs and projected recurrent costs. For example, a new school constructed this year will require recurrent cost in the years to come, in terms of the costs of regular maintenance and minor repair. Thus, for schools to be properly maintained, the projected recurrent costs should include maintenance costs to match the projected capital investment. The maintenance cost commonly may constitute from one to five percent of the annual capital cost.

2.5 Analyzing the costs of educational inclusion

The previous two sections discussed how the costs of educational inclusion programmes could be estimated and projected into the future. In this section, one assumes that educational inclusion programmes are in operation. The task here is to analyze the costs of existing programmes, based on information collected on resources devoted to these programmes (see the supply-side information provided earlier in *Table 2.3*).

There are several types of analysis of the costs of existing programmes which are useful for planning purposes. First, one ascertains how much is actually spent on educational-inclusion programmes. This may consist of finding the total (government and private) expenditure on these programmes, and the actual unit costs of these programmes. The amount of spending may be put into perspective by comparison with other spending; for example, one can compare the unit costs of these programmes with the corresponding unit costs for non-marginalized populations, one can express spending on these programmes with the total government expenditure on basic education or all education. Such information is useful for assessing and monitoring the government effort on educational inclusion over time.

Second, one can examine how resources are utilized in educational inclusion. This may consist of finding out how resources are distributed (both amount and percentage distribution) across categories of educational inclusion, across programmes within a category, across different programme efforts or sub-programmes, across different recurrent items, and across different capital items. This analysis shows 'where the money goes' and in particular, what the major cost items are. In addition, by collecting and analyzing such information over time, one can determine the trend in resource utilization and identify the factors that contribute to a change in resource utilization over time. Particular attention should be given to how teacher/instructor costs have change over time.

Third, through a resource-utilization survey of existing programmes, one can determine whether or not there is a light teaching load, whether or not facilities are underutilized, and whether or not classes are below capacity. Such information is

useful for assessing the internal efficiency of existing programmes and for improving the efficiency of resource utilization in the next round of planning.

Fourth, for programmes for which unit costs vary significantly with the scale of operation, one can collect cost data over time to find out how unit costs have actually changed with the expansion of the programmes. This information on the cost behaviour of a programme is useful for subsequent cost estimation and projection work.

Fifth, if data are available, one can determine how the recurrent and capital inputs of the programmes have been financed. This information provides a basis for designing financing strategies for supporting educational inclusion in the future.

In short, the different kinds of analysis of the costs of existing programmes fall under two time-based categories: determining the pattern of resource utilization in the past and the present, and providing information for planning programmes in the future. They are aimed at informing policy-makers and planners about the various cost-related aspects of educational inclusion, such as costing, financing, efficiency, and cost monitoring.

Chapter III. Applications of cost analysis

While the previous chapter presents the terminology, concepts, and methods of cost analysis, this chapter discusses and illustrates the applications of cost analysis to planning and policy making regarding educational inclusion. These applications generally fall under several policy contexts: cost estimation and financial evaluation, improving efficiency in the utilization of resources, managing and controlling resource requirements, and comparing the costs of educational inclusion for various purposes.

3.1 Costing and financial evaluation

The methodologies discussed in the previous chapter enable the planner to determine:

- (1) the total cost of a programme;
- (2) the short-term and long-term cost requirements;
- (3) how the cost of a programme varies with the backgrounds of participants, location, mode of delivery, scale of operation, and other characteristics;
- (4) the costs of the programme to the government, the participants, and other stakeholders; and
- (5) the distribution of costs among recurrent and capital inputs.

Not only are the above cost estimates important for financial planning and budgeting, they are also necessary for evaluating the financial feasibility of an educational-inclusion programme. The financing of educational inclusion is concerned with the process by which resources are obtained and allocated to various educational-inclusion programmes. Decisions regarding how resources are

obtained and allocated can be based on a number of criteria (such as efficiency, equity, choice, adequacy, empowerment, and others). Although the topic of financing is outside the scope of this booklet, it should be recognized that financing decisions should be based on proper cost estimation. One important financing decision concerns whether there are enough resources to sustain the financial requirements of educational inclusion. While there can be many reasons why education programmes or reforms have failed in so many countries, experience has shown that a contributing factor is the lack of attention to cost estimation and financial evaluation of the programmes or reforms (Tsang, 1988).

Based on the ingredients approach, the following discussion presents four examples to provide concrete illustrations of the estimation of the costs of basic education in a variety of situations.

Example 3.1 Providing primary schooling in a rural area

In this example, it is assumed that a significant number of rural children are not in primary school and that many rural communities do not have a primary school. Thus a major educational inclusion programme is the provision of new primary schools for such children. Given the prevailing population density in most rural areas, a six-classroom primary school (one classroom per grade) is designed. Primary schooling in rural areas may, however, be provided in different ways. The primary school can be equipped in such a way that it has essentially the same inputs as schools in urban areas (the 'input equivalency' approach). Alternatively, the school will provide a learning experience similar to those in urban areas; this 'learning equivalency' approach may require additional resources to compensate for the home and other deprivations of children in rural areas (Windham, 1990). Which alternative to adopt is an important planning decision; it concerns the definition of basic education for all. Assume that the Ministry of Education has decided that the following package of ingredients is provided to all children attending a six-classroom school:

Recurrent ingredients: a principal (with at least ten years of previous teaching experience), four teachers (mostly inexperienced or less qualified), two experienced teachers (with relatively more

training in language or mathematics), one support staff (minimal qualification), a set of textbooks for each pupil, school supplies (estimated to be US\$300 per school per academic year), replacements for reference books and teaching guides (estimated to be US\$250 per year), utilities (estimated to be US\$150 per school per academic year), minor school repair/regular maintenance (estimated to be US\$300 per school per year), and miscellaneous items (estimated to be US\$230 per year for travel expenses for school personnel, expenses for social activities involving the school and the community, etc.). The pupil is not required to pay tuition or other school fees; he or she can walk to school. But some direct private costs are expected (indirect costs are assumed to be zero).

Capital ingredients: each school has six classrooms, one staff room, one inventory room, two toilets, an activity room, and a playground. Each pupil has a chair and a desk. Each staff member has a chair and a desk. The school is planned for twenty pupils per classroom (or 120 pupils per school). The total construction area of the school (excluding the playground) and the size of rooms are such that the gross construction area per pupil is 2.5 square meters. The new school also has five bookshelves of reference books, teaching guides, and other instructional materials. The school is also provided with some teaching aids and other school equipment. The land for the school has to be purchased from a local owner.

Table 3.1 shows the hypothetical recurrent costs and capital costs of primary schooling in a rural area in such a relatively low income country. The figures provided are for illustration and may not reflect actual conditions. According to *Table 3.1*, the sum of personnel costs, non personnel costs, and direct private costs (excluding school fees which are a transfer cost) equals US\$17,730 per year, or US\$148 per pupil per year. For the government, the gross cost is US\$13,530 or US\$113 per pupil; and the net cost is US\$12,930 (after deducting school fees paid by parents) or US\$108 per pupil. The net direct private cost is US\$4,800 or US\$40 per pupil. Here school fees are collected by the government to support the overall recurrent education expenses of the government, not for any particular recurrent input. The per-pupil recurrent cost can be multiplied by the number of new pupils to obtain the total recurrent cost required to accommodate the new pupils.

To estimate the capital costs of a six-classroom school, the planner most probably has to consult the relevant school construction department and equipment-supply department on the unit costs of capital inputs. *Table 3.1* shows that the total capital cost is US\$70,785 per school, or US\$590 per pupil (US\$489 per pupil for the government and US\$101 per pupil for the parent/community). To determine the capital cost per pupil per year, annualization of the various ingredient costs is necessary. Using a 10 per cent discount rate and assuming that the school buildings last for 30 years, tables and chairs, teaching aids, book shelves, and school equipment and other items last for five years, books last for three years, and that the cost of land is divided evenly over 100 years, the cost is then estimated to be US\$66 per pupil per year. The total cost per pupil is useful for determining the total capital cost required (as a product of total cost per pupil and number of new pupils); the total cost per pupil per year is needed in planning capital investment over time. In the financing scheme, it is assumed that the community will contribute 20 per cent (in cash and in kind) towards the cost of the school building as well as 100 per cent of the required book shelves. Thus, the net cost for the government is US\$58,685 per school, US\$489 per pupil, and US\$55 per pupil per year. Note that the contributions from families and the community are directed at specific education inputs; they may occur at the school site or may be given to a local government. They rarely enter into the budget of the central/federal or provincial/state governments. Some countries do receive a significant amount of external aid for school construction. For these countries, the column on government financing in *Table 3.1* will refer to the total amount for government financing (from both domestic government revenue and external aid to the government); alternatively a column on external financing can be added to the right hand side of *Table 3.1*.

Cost analysis of educational inclusion of marginalized populations

Table 3.1 Costs of primary schooling in rural areas (Example 3.1)

Financing sources ingredients	Quantity	Price (\$)	Cost (\$)	Ingredient costs	
				Government (\$)	Family (\$)
(A) Recurrent					
<i>Personnel costs</i>					
Principal	1	2 000	2 000	2 000	0
Teachers	4	1 500	6 000	6 000	0
Exp. teacher	2	1 750	3 500	3 500	0
Support staff	1	800	800	800	0
(sub total)			(12 300)	(12 300)	(0)
<i>Non personnel costs</i>					
School supplies	-	-	300	300	0
Textbooks, etc.	-	-	250	250	0
Utilities	-	-	150	150	0
Minor repairs	-	-	300	300	0
Miscellaneous	-	-	230	230	0
(sub total)			(1 230)	(1 230)	(0)
<i>Direct private costs (excluding school fees)</i>					
School uniforms	120	15	1 800	0	1 800
Writing supplies	120	10	1 200	0	1 200
Others	120	10	1 200	0	1 200
(sub total)			(4200)		(4200)
Sum (Gross)			17 730	13 530	4 200
Transfer cost (school fees)				-600	600
Total recurrent cost (net)			17 730	12 930	4 800
Per-pupil recurrent cost			148	108	40
(B) Capital					
Land	-	-	5 000	5 000	0
Building	2.5x120	200	60 000	48 000	12 000
Staffs' chairs and tables	8	45	360	360	0
Students' chairs and tables	120	30	3 600	3 600	0
Book shelves	5	20	100	0	100
Books-reference	70	1.5	105	105	0
Books-others	240	0.5	120	120	0
Teaching aids	-	-	1 000	1 000	0
Others			500	500	0
Total capital cost			70 785	58 685	12 100
Per pupil capital cost			590	489	101
Per pupil capital cost per year			66	55	11

Implicit in *Table 3.1* is a set of standards or norms characterizing the primary-schooling programmes (such as one teacher per classroom, one experienced teacher to two inexperienced teachers, 20 pupils per classroom, 2.5 square meters of gross construction area per pupil, 10 reference books per instructional staff, 2 books per pupil, etc.). From the perspective of the planner or cost analyst, these standards have to be clearly stated in the programme description so that costs can be estimated. These standards presume that a lot of careful thinking has been given to:

- (1) what ingredients and in what combination will be relevant for effective learning in primary school; and
- (2) what foundation levels of these ingredients should be assured for all children. Both aspects have to be informed by prior in-depth studies of teaching and learning in school.

The above table shows the costs for providing places for children previously not having access to school (costs of broadening access to a new group). These costs usually represent the great majority of the costs of broadening access to primary schooling. There may be other costs required to support such a programme. A large expansion in pupil enrolment may require the expansion of an existing administrative unit within the government. There may be a need to provide in-service training to existing teachers and to expand pre-service teacher education. These other costs can be estimated using the ingredients approach.

The above example estimates unit costs of primary schooling resulting from the construction of *new* schools. In some countries, boys schools are separated from girls schools. Thus, two sets of cost estimation are needed for these countries. For some rural areas, increased enrolment can also be accommodated by both upgrading and enlarging the size of *existing* schools. School enlargement is aimed at increasing the pupil capacity of the school; and school upgrading attempts to meet the foundational level of quality set for all schools. The package of ingredients will specify the elements of upgrading and information about the number of teachers, classrooms, and other inputs to be added to the existing school. Again, the ingredients method can be used to estimate the per pupil costs of school upgrading and expansion. Finally, for some remote rural areas, the population is so sparse that there are

not enough pupils to fill a six-classroom primary school. For these areas, a three or four-classroom primary school may be designed and multi-grade teaching will be necessary. The per pupil costs of such small schools are likely to be different from those of the six-classroom schools; however, the procedure of cost estimation is similar. In the estimation of the costs of educational inclusion, a prior school-mapping exercise is often necessary in order to assess the needs for new school construction, school enlargement, and school upgrading.

Example 3.2 Raising the mathematics achievement of disadvantaged children in lower-secondary schools

For some countries (usually the relatively high income countries), lower-secondary schooling (say, Grades 7 to 9) is considered part of basic education. And in some of these countries, children from disadvantaged (or 'at-risk') backgrounds (such as low income, and minority) are much more likely to perform poorly in lower-secondary schools than their counterparts. Poor academic performance will have negative effects on continuing education and future life chances (Levin, 1989). Programmes to improve the academic performance of these disadvantaged children beginning in Grade 7 (one may also argue that such efforts should begin in primary grades) may be considered part of the educational-inclusion effort in these countries.

Assume that there is a government-funded programme for raising the achievement in mathematics of pupils from disadvantaged backgrounds and that there is a mechanism for distributing such government funds. For purposes of illustration, this programme experiments with two alternative strategies for raising mathematics achievement at the initial phase. One strategy employs 'peer tutoring' and the other uses 'computer-assisted instruction' (CAI). The objectives of cost analysis are to estimate the per-pupil cost of each alternative and to compare the cost-effectiveness of the two alternatives. Here, the ingredients approach is adopted to estimate the per-pupil costs (the cost-effectiveness comparison is illustrated in *Example 3.6*). For simplicity, it is assumed that there are no direct private costs involved and the indirect cost of a pupil's time is negligible. In this example, the programme is

sponsored and funded by the education unit of a local government (such as a school district). A description of each strategy is given in the following (also see Levin, Glass, and Meister, 1984).

Peer tutoring: a Grade 7 pupil receives one-on-one tutoring for an hour after school everyday from a Grade 9 pupil selected by the school (based on the more advanced pupil's academic performance and communication skills). The tutoring will last for one academic year and the academic progress of the Grade 7 pupil will be periodically monitored. *Table 3.2* provides an illustration of the ingredients and costs required. In this example, it is assumed that there are thirty Grade 7 pupils receiving tutoring in each school; there are 100 participating middle schools in a local administrative unit. The tutors will be recruited from each school and they will receive some short-term training organized by the local administration. Obviously, there are costs associated with personnel, equipment, materials, and facilities at both the school sites and the central office of the education unit. The costs of equipment, materials, and facilities listed in *Table 3.2* already represent the annualized costs of such ingredients. The cost is US\$373 per pupil per academic year.

Computer-assisted instruction: Grade 7 pupils will meet in a computer laboratory (created by renovation of an existing room) in the school which can accommodate thirty pupils at one time. In each session, pupils work on exercises (the 'drill and practices' approach) on computer terminals and under the supervision of a teacher. The terminals are linked to a minicomputer which stores a leased curriculum (provided by a company which specializes in writing curricula for CAI). Each of the participating teachers in the 100 middle schools receives some training in CAI. Each pupil attends five sessions per week and for the academic year. The academic progress of the pupils is monitored periodically. It is assumed that, in each school, the computer laboratory is used for the CAI intervention as well as for other purposes so that the CAI intervention accounts for one-sixth of the total scheduled time for the laboratory. *Table 3.3* provides an illustration of the ingredients and costs required. The cost is US\$637 per pupil per academic year.

Cost analysis of educational inclusion of marginalized populations

Table 3.2 Per pupil cost of peer-tutoring method (Example 3.2)

Ingredients (price and amount)	Ingredient cost (US\$ per year)
<i>Personnel/central office</i>	
(1) 1 tutorial administrator for 100 schools at US\$25,000 per year (1/100 per school)	250
(2) 1 administrative assistant for 100 schools at US\$18,000 per year (1/100 per school)	180
(3) 1 clerk for 100 schools at US\$15,000 per year	150
(4) 10 training consultants for 1 day at US\$200/day (1/100 per school)	20
<i>Personnel/school</i>	
(1) 30 tutors at US\$100 per academic year	3 000
(2) 1 tutor manager at US\$8/hr. for 2 hrs/day x 22 days/month x 10 months	3 520
(3) 1 principal (5% time) at US\$30,000 per year	1 500
<i>Equipment and materials</i>	
(1) Tutoring manual for 30 tutees, US\$5 each	150
(2) Equipment and materials at central office	25
(3) Equipment and materials at school	200
<i>Facilities</i>	
(1) Central office space	200
(2) School space for tutoring, training, and office	2 000
(3) School furniture (assumed no opportunity cost)	0
Total cost per year	11 195
Total cost per year per pupil	373

Source: Adapted from Levin, Glass, and Meister (1984).

Table 3.3 Per pupil costs of computer-assisted instruction method (Example 3.2)

Ingredients (price and amount)	Ingredient cost (US\$ per year)
<i>Personnel/central office</i>	
(1) 1 CAI coordinator for 100 schools at US\$25,000 per year (1/100 per school)	250
(2) 1 clerk (50%) for 100 schools at US\$15,000 per year (1/100 per school)	75
(3) 10 training consultants for 1 day at US\$200/day/consultant (1/100 per school)	20
<i>Personnel/School</i>	
(1) 1 principal (5% time) at US\$30,00 per year	1 500
(2) 1 teacher (20% time) at US\$22,000 per year	4 400
(3) 1 teacher's training time for 1 day at US\$100/day	100
<i>Equipment and materials</i>	
(1) 1 minicomputer with 2 Mb memory and 80 Mb storage at US\$25,000, annualized at 10% over 5 years, 1/6 time used	1 099
(2) 30 terminals at US\$700 each, annualized at 10% over 5 years, 1/6 time used	923
(3) 2 printers at US\$500 each, annualized at 10% over 5 years, 1/6 time used	44
(4) Software at US\$30,000, annualized at 10% over 5 years, 1/6 time used	1 319
(5) Curriculum rental for CAI	2 500
(6) Supplies for CAI	2 000
(7) Installation cost at US\$3,000, annualized at 10% over 5 years, 1/6 time used	132
(8) Maintenance of hardware	1 000
<i>Facilities</i>	
(1) Central office space (cost per school)	248
(2) School space for CAI	2 000
(3) Renovation of school space (1/6 time used)	1 500
Total cost per year	19 110
Total cost per year per pupil	637

Source: Adapted from Levin, Glass, and Meister (1984).

Note that the unit costs enable the calculation of the total cost required for providing the programme to all disadvantaged children under each strategy. But one cannot infer from these unit costs which strategy is preferable. Information on the effectiveness of the two strategies is also needed to compare their cost-effectiveness. Presumably, at the end of the one-year experimentation, one can evaluate both strategies to identify the more cost-effective one.

Example 3.3 Providing adult basic training through a distance-education method

In some countries, a significant proportion of adults are illiterate. Basic literacy training using radio or television is a common way of reaching these adults. A distance-education method may be preferred to an institutional approach to adult training because of economic considerations. In remote and sparsely populated areas, it may be too costly to provide adult training in an institutional setting. Even in other areas, the ability of distance education to reach a large population may make this method a low-cost strategy to foster adult literacy. Since the design and costing of distance-education programmes are described in details in the literature (Eicher, et. al., 1982; Jamison, Klees, and Wells, 1978; Perraton, 1982), this example provides only a brief discussion and illustration of the costing issues involved.

Most distance-education projects involve large capital costs. Such costs generally consist of the costs of developing broadcast modules and related study guides, the costs of installation, the costs of broadcasting equipment, the costs of reception, and the costs of major repair and replacement of equipment (especially for television). There is heavy capital investment at the initial phase. A common characteristic of the capital cost of a distance-education programme is that the per-participant capital cost declines with increasing enrolment, without adverse effect on the quality of the programme (the effect known as 'economies of scale'). To reach a low level of capital cost per participant per year, the distance-education programme has to reach a large population and to be operated for an extended period of time (at least ten to twenty years). Because of the substantial initial fixed cost, the unit cost will be very high if the programme has a limited audience or a

short life. Experience has shown that the unit capital cost of distance education can vary significantly among countries. Cost estimation should be undertaken with respect to the specific design and price factors in a given country. The planner will have to consult other relevant departments which have expertise in the design of such programmes and which have information on the costs of hardware for such programmes.

The recurrent costs of a distance-education programme obviously depend on the specification of the package of recurrent ingredients used. Experience has shown that there is no one medium that is the most appropriate for all settings; in reality a mixture of big media (such as TV) and little media (such as radio) may be used. While earlier studies have provided some evidence that small media may be more cost-effective than large media, the rapid advance in technology may alter the situation (Schramm, 1977). Nevertheless, a common finding is that distance-education programmes do require trained technical personnel to operate and maintain the broadcasting equipment. For distance-education programmes, unit costs are often expressed in a per-hour basis (that is, costs per broadcast hour, or costs per instructional hour).

Table 3.4 gives the hypothetical units costs of an adult education programme by radio. It shows that there are recurrent and capital costs involved in the production, transmission, and reception of the programme. The unit costs associated with production and transmission are expressed in dollar per broadcast hour while the unit costs of reception are in dollar per participant. Note that unit capital costs are dependent on the discount rate (r) and the length of life of the capital good (t). It is assumed that t equals 20 years for studios and 5 years for other capital goods. To show how unit costs vary with the discount rate, *Table 3.4* provides cost estimates for three different values of r : 5 per cent, 10 per cent, and 15 per cent.

Example 3.4 Adult basic literacy through a variety of sponsorship

Adult basic literacy programmes are offered in a variety of ways under different sponsorship. Adult training may be offered by public school systems, colleges and universities, community organizations, proprietary schools, and labour unions and

Cost analysis of educational inclusion of marginalized populations

employers. Such training often takes place in the existing facilities of a school or university or in other rented or donated facilities. The instructors may be temporary hires or may be staff members who also have other non-instructional duties. The programmes are administered by personnel who perform other duties which may or may not be related to the programmes. Thus joint production is a common phenomenon and it is necessary to ascertain the proportion of the service of an input to the programme to be costed.

Table 3.4 Costs of adult education by radio (Example 3.3)

	Discount rate					
	5 per cent		10 per cent		15 per cent	
	C/P	C/H	C/P	C/H	C/P	C/H
<i>Production</i>						
Capital						
Studios		5.0		7.2		10.0
Studio equipment		10.0		11.4		12.9
Audio tapes		0.6		0.7		0.8
<i>Recurrent</i>						
Personnel		300.0		300.0		300.0
Equipment maintenance		15.0		15.0		15.0
<i>Transmission</i>						
Capital (transmitters)		5.0		7.2		10.0
Recurrent		25.0		25.0		25
<i>Reception</i>						
Capital (receivers)	1.0		1.1		1.3	
Recurrent	0.7		0.8		0.9	
Total	1.8	360.6	1.9	366.5	2.2	373.7

Source: Adapted from Jamison, Klees, and Wells, 1978:144 (on radio education in Mexico).
Note: C/P is cost (US\$) per participant and C/H is cost (US\$) per hour.

Table 3.5 provides an illustration of how adult training under different sponsorship may be costed and compared. It adopts an input-based classification of costs. The hypothetical costs are divided into two categories: programme costs and 'overhead' costs. Programme costs are costs related to the programme only; they include costs of personnel, supplies, facilities, equipment, and other ingredients. Overhead costs refer to the costs of ingredients which are used partly in the programme; they include costs of personnel, facilities, equipment, and other ingredients which are jointly used in the programme and for other purposes. The overhead costs of a programme should be based on information on the proportion of time that the joint ingredients are devoted to the programme. Note that adult programmes under different sponsorship may have different distributions of costs across inputs; for example, some programmes may spend relatively more on their own staff than on personnel from outside, and some programmes may spend relatively more on their own facility and equipment than on rented ones.

The sum of the ingredient costs is the total cost of the programme. With information also on the total number of training hours provided in the programme, one can obtain an estimate of the total cost per training hour, for each programme. Experience has shown that, because of differences in class size and instructional format, the total cost per training hour can vary significantly among programmes under different sponsorship (Anderson and Kasl, 1982).

The ingredients approach can also be used to estimate the costs of an early-childhood programme. For example, a pre-school programme may be designed for children from disadvantaged backgrounds so that such children are engaged not only in learning activities, but they also receive proper nutritional care. The tasks of cost estimation are to identify ingredients of the programme and to estimate the costs of the ingredients.

Table 3.5 Costs of adult training under different sponsorship (Example 3.4)

Costs (thousand dollars)	Public school systems	Colleges and universities	Community organizations	Sponsors		
				Proprietary schools	Labour unions	Employers
<i>Programme costs</i>						
Personnel (staff)	10	18	8	25	2	75
Personnel (non-staff)	20	14	20	0	10	25
Facility (rented)	0	0	8	8	4	25
Equipment (rented)	0	0	4	6	2	5
Supplies	4	2	2	4	2	10
Others	2	2	2	1	4	10
<i>Overhead costs</i>						
Personnel (staff)	8	6	2	4	2	10
Facility	8	10	0	0	0	25
Equipment	6	6	0	0	0	5
Others	2	2	2	2	2	10
Total cost ('000)	60	60	48	50	28	200
Total training hours ('000)	10	5	2	5	2	5
Total cost per training hour (\$/hr)	6	12	24	10	14	40

3.2 Efficiency and cost evaluation

A persistent challenge for educational policy-makers is how to achieve quantitative and qualitative improvements in educational inclusion under tight budgetary constraints. A major strategy to meet this challenge is to raise the efficiency in the allocation of available resources to education inclusion. Efficiency in resource allocation is said to be improved when more output is produced at a given cost or less cost is used to achieve a given level of output.

Cost evaluation is an application of cost analysis for assisting policy-makers to make more efficient allocative decisions. It takes account of both the costs and outcomes of alternative strategies of educational inclusion, making it possible to choose those alternatives that maximize educational inclusion for given cost resources outlay or minimize resource requirements for a given level of educational inclusion. It is an applied method for improving the allocation of resources among potential alternatives of educational inclusion.

The basic procedure of cost evaluation consists of three steps:

- (i) identifying alternative strategies for achieving a given definition of educational inclusion;
- (ii) determining the costs and outcomes of these alternative strategies; and
- (iii) comparing the outcome per unit cost (or cost per unit outcome) among the alternative strategies.

The exercise begins with an identification of strategies, or interventions that can achieve educational inclusion. Only strategy which can contribute to educational inclusion will be considered but it is important to include all the strategies that may have an impact on the academic achievement of such children for cost evaluation. An omitted strategy may turn out to be the most efficient strategy for achieving this objective of educational inclusion.

Assuming that a number of relevant strategies have been identified, the next step is to determine the costs and the outcomes for each strategy. The ingredients approach can be used to determine the total cost and unit cost of each strategy; in addition, one may also identify the sources of financing (and thus the distribution of the cost burden) for each strategy.

The outcomes of an educational-inclusion strategy can be measured as benefits, effects, or utility, depending on the objectives to be achieved. Benefits refer to those outcomes that can be measured in monetary terms. For example, to the extent that literacy training can improve the productivity of an adult in production, the benefit can be measured as the economic value of the higher productivity of the adult. Effects are outcomes that can be assessed in their own attributes. For example, the effect of peer tutoring in mathematics can be measured to be the gain in mathematics test score for pupils. Depending on the programme objective, other common measures of effectiveness may include: pupils' affective development, physical skills, test scores in a subject area, number of pupils or participants completing a programme, and number of potential dropouts who graduate. Utility refers to outcomes that are measured in terms of their subjective value to a key decision-maker. For example, in deciding which programmes to eliminate in order to balance the budget, the key administrator can show the utility of each programme by assigning a utility score to each programme which reflects the perceived importance or value of the programme.

Depending on the nature of the outcomes, there are three different types of cost evaluation: cost-benefit evaluation, cost-effectiveness evaluation, and cost-utility evaluation. Cost-benefit evaluation refers to the evaluation of alternatives by comparing their costs and benefits. An alternative is judged to be a profitable investment when benefits exceed costs. Other things being equal, an alternative with a higher benefit-to-cost ratio is preferred to one with a lower benefit-to-cost ratio. Note that this type of cost evaluation requires that the outcomes be expressed in monetary terms. A common application of cost-benefit analysis to education can be found in the evaluation of the social rate of return to different levels of education (Cohn and Geske, 1990: Chapter 5).

Cost-effectiveness evaluation refers to the evaluation of alternatives by comparing their costs and effects. It is applied to alternatives with a common objective and a common measure of effect (such as increase in test score in mathematics). If the alternatives have the same cost (or same effect), then the one with the highest effectiveness (or lowest cost) obviously is the most desirable alternative, other things being equal (for example, all the

alternatives are operated efficiently). But in practice, the alternatives may have different effects and costs. Consider two alternatives, A and B. A is clearly preferable to B if A has a lower cost and a larger effect than B (other things being equal). However, it is not clear whether A is preferable to B if A is both more costly and more effective than B. The choice between them depends on decision-makers' relative valuation between effectiveness and cost. A may be preferred to B (or B preferred to A) if the additional effectiveness of A is valued more (or less) than the additional cost of A. It should be noted that cost-effectiveness analysis cannot be applied to strategies with different measures of an outcome or with a multiple of outcomes. Since educational inclusion may be concerned with learning in a certain subject area or some other measure of educational performance, cost effectiveness analysis can have wide application in educational inclusion (see *Example 3.5* below).

Cost-utility evaluation refers to the evaluation of alternatives by comparing their costs and utility. In contrast to cost-effectiveness analysis, it can be applied to strategies with different outcomes or multiple measures of an outcome (see *Example 3.6* below). It is appropriate for cost evaluation when subjective assessment has to be made about the relative values of outcomes. However, since it is a subjective method, its findings cannot be generalized across policy-makers.

In each of the three types of cost evaluation, the ranking of the outcome-to-cost (or alternatively cost-to-outcome) ratios will serve as one important criterion for choosing among alternatives. Other considerations may also be included in the decision; for example, the distribution of the costs and outcomes among different target groups (assessing equity implications), the relative ease in implementation of strategies, etc.

Given the focus on costs, this booklet does not discuss the measurement of benefits, effectiveness, and utility. The interested reader can refer to such treatment in the literature (Cohn and Geske, 1990: Chapter 3; Rossi and Freeman, 1989; Stokey and Zeckhauser, 1978: Chapter 12).

*Example 3.5 Cost-effectiveness of alternatives for raising the
mathematics achievement of disadvantaged children
in lower-secondary schools*

Example 3.2 estimates the costs of two strategies for raising the mathematics achievement of disadvantaged children in lower-secondary schools. It is shown that the peer tutoring strategy costs US\$373 per pupil per year and that the computer-assisted instructional strategy costs US\$637 per pupil per year. A choice among them can only be made if information on the outcomes of these two strategies is made available.

The outcomes of the two strategies may be defined as the improvement in mathematics learning as a result of the treatment. Here one can compare the mathematics learning of pupils subject to one strategy with that of pupils receiving no intervention, at the end of one year. The improvement in mathematics learning can be measured in terms of the additional (standardized) increase in mathematics test score attributed to the strategy.

Assume that, after one year of treatment, the peer tutoring strategy results in an average increase of 0.20 of a standard deviation in mathematics test score for each pupil while the average increase for the computer-assisted instructional strategy is 0.25 of a standard deviation for each pupil. This is a situation where cost-effectiveness analysis can be applied because there is one common objective and one common measure of effectiveness. In this example, the CAI strategy has both a higher cost and a larger effect than the peer-tutoring strategy. Other things being equal, CAI may be preferred to peer tutoring (or vice versa) if the additional effectiveness of CAI (0.05 of a standard deviation in mathematics test score) is valued more (less) than the additional cost of CAI (US\$264 per pupil); the judgement is dependent on the valuation of the decision-maker in the education unit of the local government concerned.

Note that the effectiveness-to-cost ratio is .00054 standard deviation per dollar for peer tutoring and .00039 standard deviation per dollar for CAI (the corresponding cost-to-effectiveness ratios are 1,865 and 2,548 dollars per standard deviation). Thus, peer tutoring produces more effect per dollar of cost. If the programme were sponsored and funded by a provincial/state government and

the above effectiveness-to-cost ratios were applicable to local governments within the province/state, then the decision-maker(s) in the provincial/state government might prefer the peer-tutoring strategy since it would generate a larger total effect than the CAI strategy for pupils in the province/state, given a budget for the programme (other things being equal). The figures in this example are provided for illustrative purpose only; peer tutoring may or may not be more cost-effective than CAI. One may note that with the rapid advance in computer technology, the costs of computer software and hardware may decrease over time and thus make the CAI strategy more cost-effective.

Example 3.6 Cost utility analysis of alternatives for raising pupil achievement in primary school

An educational decision-maker is concerned with increasing the achievement of marginalized pupils in the subject areas of language and mathematics at the primary level. Assume that previous studies have found that there are three strategies that are effective in raising pupil achievement in both language and mathematics. As shown in *Table 3.6*, for the average pupil, strategy A produces an increase of 10 points in mathematics and 20 points in language, strategy B produces an increase of 20 points in mathematics and 5 points in language, and strategy C produces an increase of 15 points in mathematics and 15 points for language. One cannot have a total test score for each strategy by summing the two achievement scores because the two scores are for different subjects. Thus cost-effectiveness analysis cannot be applied in this situation. Instead, one can ask the educational decision-maker to rate the utility of the two subjects. The hypothetical utility levels for mathematics and language shown in *Table 3.6* reflect the decision-maker's judgement on the relative value of the two subjects. The overall utility of each strategy to the decision-maker can be measured as the sum of the product of mathematics score and mathematics utility, and the product of language score and language utility. According to this procedure, strategy A has the highest utility, followed by strategy C, and then strategy B.

Table 3.6 Cost utility analysis of alternative strategies to improve student achievement in primary school
(Example 3.6)

Strategy	Mathematics score (point per pupil)	Language score (point per pupil)	Utility for mathematics (utility point per math. point)	Utility of language (utility point per lang. point)	Overall utility (utility point)	Unit cost (pupil per \$)	Utility to cost ratio (utility point per \$)
A	10	20	5	10	250	500	0.50
B	20	5	5	10	150	225	0.67
C	15	15	5	10	225	200	1.13

Assume also that a separate cost estimation task using the ingredients approach has been conducted and it shows that the unit cost for strategies A, B, and C are respectively US\$250 per pupil, US\$225 per pupil, and US\$200 per pupil. Thus strategy C is the least costly among the three strategies. Other things being equal, strategy C is clearly better than strategy B since C is less costly and has more utility than B. The choice between C and A is more problematic since C is less costly but has less utility than A; it depends on the relative valuation of utility level and cost. The above examples indicate that it is important for decision-makers to base their decisions on information on both the costs and outcomes of alternatives.

3.3 Cost containment and cost comparison

In many countries, the resource requirements of educational inclusion are likely to increase over time. This increase can be due to a combination of supply and demand factors. On the supply side, the prices of inputs to educational inclusion may rise in step with the increases in the price level of the economy. Practices such as the automatic increase in teacher salary based on the number of years of teaching may increase personnel cost significantly over time. On the demand side, population increase and the need to improve educational quality will also generate mounting pressure for additional resources to educational inclusion. Unless economic conditions improve significantly, the government budget in many countries may experience rather slow growth; thus, educational inclusion often has to be undertaken under very tight budgetary constraints. The previous section discussed cost evaluation techniques for improving efficiency through the allocation of resources among potential alternatives for educational inclusion. Efficiency can also be improved by more fully utilizing existing resources. In the latter case, the costs of educational inclusion may be reduced without adverse effect on output.

A variety of strategies of cost reduction can be explored. These may include slowing down the growth in teacher salaries, using alternative sources of low-cost teachers (such as volunteer teachers/instructors, and teachers with lower qualifications), increasing teaching load, increasing class size (if class size is

small), exploiting economies of scale of educational production, reorganizing schools (using multiple shifts, multi-grade teaching, school consolidation, and cluster school or regional co-operation), and developing alternative educational technology. Obviously, one has to be mindful of the potential negative impact of any cost reduction strategy on school quality. Cost reduction at the expense of pupil learning does not increase the efficiency in the utilization of existing resources; the political feasibility of a cost-reduction strategy has also to be properly assessed.

Since teacher costs generally constitute a large proportion of the total cost of educational inclusion, they should be examined carefully. In any educational-inclusion programmes, caution must be exercised not to specify unnecessarily high requirements for teacher qualifications. But teacher salaries should not be kept so low as to encourage competent teachers to leave the teaching profession. In reality, teacher costs are likely to increase year by year; the challenge is to contain the growth of teacher costs within the government's resources.

From a technical viewpoint, cost analysis can provide useful information to the decision-maker or planner about cost reduction. First, cost analysis helps to define the resource-requirement problem and identify the potential strategies for addressing the resource-requirement problem. As indicated previously, one can examine how resources are currently utilized, what the major cost items are, how costs have changed over time, and whether there are underutilized resources. Second, costing is necessary to estimate the savings in costs for different cost-reduction strategies.

Finally, costs of educational inclusion can be compared among themselves in a number of ways. For example, one can compare the cost of a programme over time, the cost of a programme for marginalized populations to that for non-marginalized populations, the costs of different programmes serving a similar objective or population group, the level of fiscal effort among provinces/states (provincial/state expenditure on educational inclusion compared to total provincial/state expenditure), the levels of fiscal effort of a country (total government expenditure on educational inclusion compared to total government expenditure) and national effort of a country (national expenditure on educational inclusion compared to national output) over time, and the level of national effort across

countries at a point in time. And cost comparison may be undertaken for a number of motives: assessing the level of commitment of a province/state or a country to educational inclusion, making a case for additional resources to educational inclusion, monitoring the cost of a programme over time, or comparison for equity assessment purposes. With the development of an information system on costs of educational inclusion, these different types of cost comparison can be conducted on a regular basis.

Chapter IV. Information system of costs of educational inclusion

This chapter describes the main features of an information system on the costs of educational inclusion for purposes of planning, monitoring, and policy analysis.

4.1 The need for an information system on costs

As discussed in the previous chapters, costs are at the heart of some tasks and issues in educational inclusion. The common tasks of planning include cost estimation, projection, and analysis for a variety of purposes. The tasks of monitoring are concerned with at least three aspects of resource utilization: (i) the status or current situation of how much and how resources are utilized; (ii) how resource utilization (how much and how) has changed over time; and (iii) whether progress has been made and which targets have been attained.

The common policy issues in educational inclusion concern the internal efficiency in resource utilization in a given programme, the cost-effectiveness of alternative programmes or strategies for educational inclusion, the profitability of public investment in educational inclusion, equity in the distribution of the benefits and costs of educational inclusion, and cost containment under severe financial constraints. Information on costs is obviously necessary for addressing these cost-related tasks and issues.

An information system on costs of educational inclusion is a set of procedures for collecting and processing an inter-related set of data for addressing the tasks and issues in the planning, monitoring, and policy analysis regarding educational inclusion. It is not

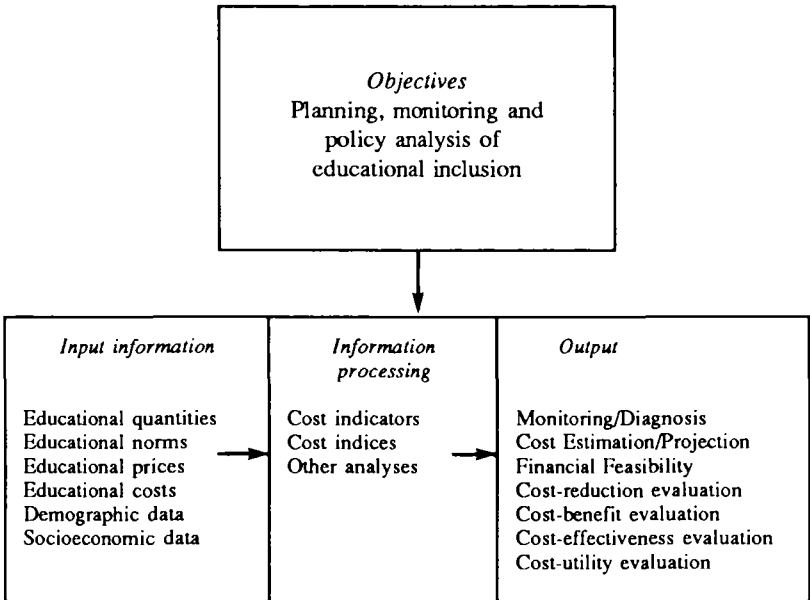
simply a collection of data. It is 'systemic' in at least two senses. First, there are objectives (expressed in terms of tasks and issues) which define what kinds of data are to be collected, what types of data processing and analyses are to be regularly conducted, and what types of applications can be made; thus data collection, data processing, and applications are related to one another in a more organic manner. Second, the information system provides 'feedback' to itself. The analysis of data at a point in time can generate findings (e.g., regarding information gaps, measurement issues) which subsequently result in the refinement or modification of the set of data and procedure for the system. The system approach is useful in that it: (i) explicitly specifies the objectives and applications; (ii) clearly identifies the information needs and processing tasks; and (iii) encourages purposeful data collection and analysis on a regular basis.

The development of an information system is an evolving process. The findings can also be diagnostic with respect to the programmes of educational inclusion in that they reveal problematic areas in the programmes (such as unexpectedly high unit costs, or underutilization of resources). The diagnosis may subsequently lead to a study of or a change in the programmes concerned. Changes in educational-inclusion programmes may in turn lead to a change in the set of data and procedures for the system.

4.2 A framework for an information system on costs

Figure 4.1 presents an input-process-output framework for an information system for cost analysis of educational inclusion. The system is driven by objectives concerning the planning, monitoring, and policy analysis of educational inclusion. Data are regularly collected and analyzed to inform the cost analysis of educational-inclusion programmes.

Figure 4.1. Information system of costs of educational inclusion



Source: Adapted from Tsang, M. (1988). Cost analysis for educational policy-making: A review of cost studies in education in developing countries. *Review of Educational Research*, 58(2), p. 224.

4.2.1 *Input information*

The data as input to the information system contain all the items in *Table 2.3*; some additional items are also needed since the application is not limited to costing only (see description below). Three sets of data should be provided for the three categories of educational-inclusion programmes respectively; and if available, they are disaggregated by programmes and sub-programmes within

each category. The data will be collected annually (except for some data noted below). Each set of data can be conveniently divided into the following five groups:

Educational quantities: these are quantities of inputs to and outputs of educational inclusion. They include data on enrolments, graduates and training hours, dropout rates, number of different types of personnel, and physical inputs. In conjunction with cost data, they can be used in costing estimation and projection (especially based on the aggregate approach); they can also be used in constructing cost indicators (such as unit costs, see below). Note that in *Table 2.3*, only information on educational input is requested. If the planner is also interested in constructing resource-utilization indicators (see discussion below), then additional information on teaching load, actual class size, and facility utilization rates is also included here.

Educational norms: these are the various norms (or standards) and other characteristics that define the design of an educational inclusion programme. For example, they may include data on class size, staff-pupil contact hours, ratio of senior staff to junior staff, physical specifications of a school, etc. They are used in cost estimation and projection (especially using the ingredients approach).

Educational prices: these are the prices of various ingredients used in educational-inclusion programmes. They include data on the salary structure for various categories of educational personnel, prices of supplies and equipment, and prices for school construction. They can be used in cost estimation and projection, and in the construction of cost indices (see below).

Educational costs: these are the recurrent and capital costs associated with various programmes and subprogrammes of each of the three categories of educational inclusion. Besides the expenditures made by the government, they also contain information on private costs which may be collected less frequently (say, once in three years).

Demographic data: these are data on the quantity of demand for each programme/subprogramme in each of the three categories of educational inclusion. They can be used in cost estimation and cost projection.

Socio-economic data: these include data on national output, government expenditures, and cost-of-living price indices. They can be used in constructing cost indicators and indices (see below).

Note that the demographic data here match the information on demand presented in *Table 2.3*; data on educational quantities, norms, prices, and costs correspond to the information on supply in *Table 2.3*. The additional information needed concerns quantities of educational output, resource utilization data, and socioeconomic data.

4.2.2 *Information processing*

Two types of information-processing for the planning and policy analysis of educational inclusion can be distinguished. The first type deals with the regularly scheduled processing of data; such as the annual construction of cost indicators and cost indices, as well as the annual preparation of a budget plan for educational inclusion. The second type is information-processing other than on a regularly scheduled basis; it is often initiated to respond to the demand for cost analysis to inform policy-making regarding educational inclusion.

Cost indicators of educational inclusion are either single or composite statistics on costs that reflect the current status of or changes in resources allocation and utilization with respect to educational-inclusion programmes for purposes of monitoring and evaluating such programmes. Thus cost indicators do not simply provide information on how much and how resources are utilized in educational inclusion, they also serve to monitor and evaluate educational inclusion programmes on the basis of some policy context (such as improving efficiency, promoting equity, cost containment, and assessing progress or effectiveness). Depending

on the policy context, different kinds of cost indicators can be regularly constructed and analyzed. There are seven kinds of cost-related indicators that can deal with a variety of policy contexts. They are discussed briefly in the following and it is assumed that the unit of analysis of these cost indicators is either at the national/central level or state/provincial level. Obviously, similar indicators can be constructed at a local level. A hierarchy of cost indicators among levels of government can also be constructed (see *Section 2.2*).

(a) *Effort indicators of educational inclusion*

These indicators measure the level of effort at which a country (or a province/state) devotes its resources to educational inclusion. They can be 'national-effort' indicators or 'fiscal-effort' indicators. A national effort indicator is defined as expenditure on educational inclusion as a percentage of national output (or provincial/state output). A fiscal-effort indicator is defined as expenditure on educational inclusion as a percentage of some measure of government expenditure (such as total government expenditure on education, or total government expenditure). Expenditure on educational inclusion should refer to total (government and private) expenditure on educational inclusion if private expenditure data are available, otherwise data on government expenditure on educational inclusion can be used. Both national and fiscal indicators can be constructed for each category of educational-inclusion programmes and for educational-inclusion programmes as a whole. Information on effort indicators over time can be used to monitor the change in national and fiscal efforts over time, to assess whether a certain effort level has been reached, or to compare with the effort levels of other countries.

(b) *Distributional indicators of costs*

These indicators show the distribution of costs of educational inclusion among ingredients in a programme, among programmes, and among categories of programmes. One can distinguish between two kinds of distributional indicators. The first kind is concerned

with how costs are distributed by type of ingredients. These indicators may include personnel cost as a percentage of recurrent cost, nonpersonnel cost as a percentage of recurrent cost, recurrent cost as a percentage of total cost, or capital cost as a percentage of total cost. These indicators may be computed for a programme or subprogramme, or a category of programmes. The second kind considers how total government expenditure on educational inclusion is distributed (in percentages) among the three categories of programmes and among programmes (and subprogrammes) within a category. These two kinds of distribution indicators are useful for showing 'where the money goes' and the change in distribution over time. This information may be used in exploring cost containment strategies. The indicators may also provide diagnostic information; for example, they may show that certain programmes are unexpectedly expensive, which may prompt the planner to look into these programmes more closely.

(c) *Resource-utilization indicators*

These indicators measure how resources are utilized in basic schooling compared to norms or standards set by the ministry or department of education. Examples may include the actual average teaching load of teachers (say, number of instructional hours per week) as a percentage of the standard teaching load, the actual average pupil-to-teacher ratio as a percentage of the standard pupil-to-teacher ratio, etc. As indicated previously, information on resource utilization can be obtained from a survey of schools conducted annually or less frequently on all or a representative sample of schools. The indicators are meant to provide information on the existence of underutilization of resources (or excessive utilization in some cases) with respect to educational standards. They are diagnostic in that a low degree of resource utilization should draw attention for further inquiry. It is recommended that separate indicators be constructed for schools in different contexts (say schools in urban areas, rural areas, and remote areas). Note that the schools surveyed should not be confined to schools mostly populated by marginalized or disadvantaged children; other schools should be included as well.

(d) *Financial indicators of educational inclusion*

These indicators show the distribution of educational costs by government and private sources (and external sources for some countries) for each educational-inclusion programme, each category of educational-inclusion programmes, and for all educational-inclusion programmes. They can be readily constructed when information on financing is available, especially when the cost classification scheme is based on input type and financial source (see *Table 2.2b*). In addition to showing who bears the costs of existing programmes, they provide some baseline information for assessing how similar programmes may be financed in the future.

(e) *Unit costs of educational inclusion*

The various unit costs discussed in *Chapter II* are also cost indicators (see *Table 2.4*). Here, one can analyze the unit recurrent costs and unit capital costs of educational inclusion programmes; one can also compare the unit costs of programmes for marginalized populations with the unit costs of similar programmes for non-marginalized populations. In addition to cost estimation and cost projection, unit costs and ratios of unit costs are useful for a number of monitoring and evaluation purposes. For example, one can examine how expensive or inexpensive a programme is compared to some other programmes or alternatives, one can find out how the unit costs of a programme have changed over time (and subsequently find out why there is an unexpected change); and unit costs are needed to assess the rate of return of a programme or the cost-effectiveness of alternative programmes.

(f) *Indicators of teacher costs of basic schooling*

The costs of teachers generally constitute the majority of the recurrent costs of basic schooling. To monitor the recurrent costs of educational inclusion programmes, it is useful to also monitor the costs of teachers in basic schooling. A number of teacher-cost indicators may be used, such as total teacher cost as a percentage of total recurrent cost, total teacher cost per pupil, average teacher

salary, average teacher salary as a percentage of average salary in the private sector (or average salary of employees in the government sector), and average teacher salary as a percentage of per capita national income.

(g) *Educational-inclusion indicators*

The educational-inclusion indicators discussed in *Chapter I* (see *Table 1.1*) should also be included here because they concern the scope of educational inclusion and thus have implications on resource requirements for educational inclusion.

Cost indices are cost indicators that are used to monitor changes in costs over time relative to a base year. For a given item (say, average teacher salary), one can construct a cost index for that item over time by choosing a base year and then expressing the cost of that item in other years as a percentage of the cost of the item in the base year (Chambers, 1981). The value of the index in the base year is obviously 100. In fact, for each item, one can construct two time series, one based on current prices and the other based on real prices. Thus, one series of an index on average teacher salary is obtained by expressing the average teacher salary in current price in a given year as a percentage of that of the base year; the other series is obtained by first constructing a series of average teacher salary in real terms (average teacher salary in current price adjusted by a cost-of-living price index with the same base year) and then expressing the average teacher salary in real terms in a year as a percentage of that in the base year.

Obviously, cost indices can be constructed for a variety of cost items. Examples of cost indices include indices of unit recurrent cost, unit capital cost, unit total cost, and average teacher salary; these indices can be constructed for each educational-inclusion programme. An index of total government expenditure can be constructed for each programme, each category of programmes, and for all programmes.

Cost indicators and indices are constructed and analyzed for monitoring, and diagnostic purposes. Some of them (e.g., unit costs) plus the raw input information can also be used on a regular

basis in preparing the annual budget regarding educational-inclusion programmes.

Besides the regular processing of cost indicators and indices, the information in the cost system can be used for policy studies of educational inclusion that have a cost component. Common examples of these policy studies include the evaluation of the financial feasibility of a new educational-inclusion programme, the comparison of the cost-effectiveness of alternative strategies for educational inclusion, an assessment of the profitability of the social investment in educational inclusion, and the formulation of policies to contain or reduce costs of educational-inclusion programmes for the government.

4.2.3 *Output of information system*

The information system is developed to assist in the planning, monitoring, and policy analysis of educational inclusion. From the above discussion, one can identify the common applications of the system as follows:

- (1) Cost estimation and projection.
- (2) Monitoring and diagnosis.
- (3) Evaluation of financial feasibility.
- (4) Cost containment analysis.
- (5) Cost-effectiveness evaluation.
- (6) Cost-utility evaluation.
- (7) Cost-benefit evaluation.

Note that the framework described above concerns cost analysis in the planning, monitoring, and policy making of educational inclusion. It is self-contained and can be implemented on its own. Alternatively, it can be subsumed as a subsystem of a larger and thus more ambitious information system on educational inclusion. This larger system concerns not only cost-related tasks and issues, but also other aspects of the planning and policy making of educational inclusion (such as demand for educational inclusion, teacher supply and demand, effective teaching and learning strategies in basic education, as well as the internal and external output of educational inclusion). The discussion of the larger system is outside the scope of this booklet (see Windham, 1992).

*Cost analysis of educational inclusion of
marginalized populations*

In summary, information on costs is crucial for many important tasks and issues regarding educational inclusion. The system approach to information can institute an integrated set of procedure for identifying data needs, and for collecting and processing such data to meet a collection of well-defined applications. There is a cost of developing and managing such a cost system for educational inclusion, but this cost is very likely to be more than compensated by the gains of better planning, improved monitoring, and more informed policy making regarding educational inclusion.

Bibliography

- Anderson, R.; Kasl, E. 1982. *The costs and financing of adult education and training*. Lexington (Mass.): Lexington Books.
- Chambers, J. 1981. "Cost and price level adjustments to state aid for education: a theoretical and empirical review". In Jordon, K. and Cambron-McCabe, N. (eds.) *Perspectives in state school support Programs*. Cambridge MA: Ballinger, pp. 39-85.
- Cohn, E.; Geske, T. 1990. *The economics of education*. Third Edition. London: Pergamon.
- Coombs, P.; Hallak, J. 1987. *Cost analysis in education: a tool for policy and planning*. Baltimore, Maryland: Johns Hopkins University Press.
- Cuadra, E.; Crouch, L. 1989. *Indicators of student flow rates in Honduras: an assessment of an alternative methodology. Two methodologies for estimating student flow rates*. Cambridge, MA: Harvard University, BRIDGES Research Report Series, No. 6.
- Davis, R. 1980. *Planning education for development: Volume II, models and methods for systematic planning of education*. Cambridge, MA: USAID/Harvard.

Bibliography

- Eicher, J.; Hawkrigde, D.; McAnany, E.; Mariet, F.; Orivel, F. (Eds.) 1982. *The economics of new educational media: Vol. 3. Cost and effectiveness: overview and synthesis*. Paris: UNESCO.
- Fowler, F. 1984. *Survey research methods*. Beverly Hills, CA: Sage.
- Hallak, J. 1990. *Investing in the future: setting educational priorities in the developing world*. Paris: IIEP, UNESCO, and Oxford: Pergamon Press.
- Inter-Agency Commission for Basic Education for All. 1990. *Meeting basic human needs*. A background report for the World Conference on Basic Education for All. New York.
- Jamison, D.; Klees, S.; Wells, S. 1978. *The costs of educational media: guidelines for planning and evaluation*. Beverly Hills, CA: London Sage.
- Kalton, G. 1983. *Introduction to survey sampling*. Beverly Hills, CA: Sage Publications.
- Levin, H. 1983. *Cost-effectiveness: a primer*. Beverly Hills, CA: Sage.
- Levin, H. 1989. "Financing the education of at-risk students." In *Educational Evaluation and Policy Analysis*. Vol. 11, No. 1, pp. 47-60.
- Levin, H.; Glass, G.; Meister, G. 1984. *Cost-effectiveness of four educational interventions*. Stanford, CA.: Center for Educational Research at Stanford, Stanford University, Project Report No. 84-A11.
- Lockheed, M.; Verspoor, A.; and Associates. 1991. *Improving primary education in developing countries: a review of policy options/WCEFA*. Oxford: Oxford University Press.

- Perraton, H. (ed.) 1982. *Alternative routes to formal education: distance teaching for school equivalency*. Baltimore (M.D.): Johns Hopkins University Press.
- Ross, K.; Mählck, L. 1990. *Planning the quality of education: the collection and use of data for informed decision-making*. Paris: IIEP, UNESCO, and Oxford: Pergamon Press.
- Rossi, P.; Freeman, H. 1989. *Evaluation: a systematic approach*. Fourth Edition. Beverly Hills (Calif.), London: Sage.
- Schramm, W. 1977. *Big media little media: tools and technologies for instruction*. Beverly Hills (Calif.), London: Sage.
- Stokey, E.; Zeckhauser, R. 1978. *A primer for policy analysis*. New York (N.Y.): W.W. Norton.
- Tsang, M. 1988. "Cost analysis for educational policy making: a review of cost studies in education in developing countries". In *Review of Educational Research*, Vol. 58, No. 2, pp. 181-230.
- Tsang, M. 1994a. "Private and public costs of schooling in developing countries". In Husen, T. and Postlethwaithe, N. (Eds.) *International Encyclopedia of Education*, Second Edition. Oxford: Pergamon Press.
- Tsang, M. 1994b. "Costs of continuing education: industrialized countries." In Husen, T. and Postlethwaithe, N. (Eds.) *International Encyclopedia of Education*, Second Edition. Oxford: Pergamon Press.
- Windham, D. 1990. "The costs of effective schools" In Vedder, P. (Ed.), *Fundamental Studies in Educational Research*, Institute for Educational Research (Netherlands), Amsterdam Lisse: Swets and Zeitlinger, pp. 35-57.

Bibliography

- Windham, D. 1991. "The role of basic education in promoting development: aggregate effects and marginalized populations". In Chapman, D.; Walberg, H. (Eds.) *Strategies for enhancing educational productivity*. London: JAI Press, pp. 91-107.
- Windham, D. 1992 *Education for all indicators: a proposed framework, manual, and implementation plan*. Albany, New York (N.Y.): UNICEF.
- World Bank 1992. *World development report 1992*. New York (N.Y.): Oxford University Press.

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