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Abstract
                    Directed toward personnel in the Agency
for International Development (AID), this document reviews
the planning of AID educational assistance programs in
developing nations. The report recommends that AID
personnel should be in a position (a) to assign, organize,
and monitor the planning of their own activities in the
field of education; (b) to advise or inform host countries
on the logistics of educational planning, including their
statistical, institutional, and specialized manpower needs;
and (c) to evaluate the planning efforts undertaken by host
countries. Techniques of educational resource planning
range from standard practices using teacher/student ratios,
etc., to more detailed partial and full optimization models
based on linear programing methods. Priorities in declining
order should be given to production planning of education
at all levels, financial planning, and resource planning.
The report warns that AID assistance programs must be
careful to avoid the label of an "American Reform" in any
objective that is achieved in planning and policy
formulation, out of respect for intense nationalistic
emotions and desires of developing nations. (LN)

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Educational Planning:

A Critical Review and

Recommendations for A.I.D.

INTRODUCTION

A.I.D. missions have on hand an excellent collection of books, pamphlets, and papers on the subject of educational planning assembled for them by the Education Division in Washington. Were it possible for mission personnel to read and assimilate the material made available to them, they would be a long way toward possessing a respectable expertise in the field.

This, however, would not represent a high level of achievement. Expertise in educational planning--in areas of concern to social scientists, as opposed to those pertaining to educational administration and management-- is of notoriously poor quality. Economists, who represent the most active and most articulate group in the field, share their time between developing ambitious and/or elegant models that are admittedly not operational for policy development, and giving professional educators the benefit of their universal wisdom concerning efficient methods of teaching children. They are also prone to mounting vicious critical attacks on the few "established" models that, while dangerous in incautious hands, offer at least a set of tentative planning guidelines. Along with this internal bickering, various fads tend to dominate the scene at one point or another, generally reflecting dissatisfaction with the lack of progress experienced while contrary prejudices were in effect. On the whole, however, there is a remarkable uniformity in the methodologies actually <u>implemented</u> by economists of all persuasions, when faced with genuine planning responsibilities. This largely reflects the subjection of operational analysis to the data base available and to political or institutional constraints effective in planning countries.

The fact that a standard "education planning exercise" can be synthe-
sized from the planning experience of a large number of countries at all
stages of development does not mean that the shortcomings deplored by "critical"
economists are insubstantial, or that much better results could not eventually
be achieved through more sophisticated analysis. Even though few education
systems can fairly be said to have evolved in accordance with systematic long-
range plans, major .'ailures of education can be identified in countries that
have had education planning for many years; and many of these failures are
associated with levels of achievement that, while not clearly determined by
the Plan, are at least consistent with its targets. Clearly, what has become
the "traditional" planning methodology stands in need of improvement; and a
major input in the development of new strategies must come from the critical
analysis to which older methods have been subjected.

It cannot be expected that a short paper of the type that a few weeks
of research can produce will develop a well articulated strategy of educa-
tional planning comparable in scope to, say, the Harbison classic. The
objective of this paper is more limited and somewhat different. First,
it is not addressed to economists as a professional audience, but rather to
the range of personnel manning the education divisions of A.I.D. and to those
economists in program divisions who contribute their skills to educational
planning efforts. It is assumed that some of the studies suggested as part
of the planning exercise will require the services of professional economists
(as well as sociologists and political specialists), but that mission personnel
should be in a position (a) to assign, organize and monitor the planning of
their own activities in the field of education (the most relevant form of
"educational planning" from A.I.D.'s standpoint), (b) to advise or inform

host countries on the logistics of educational planning, including their
statistical, institutional, and specialized manpower needs, (c) to evaluate
the planning efforts undertaken by host countries and to exercise influence
on their direction as well as on subsequent policies. Secondly, emphasis
is placed on the uncertainties surrounding outcomes of educational decisions
and on the quality of predictions based on alternative measures and calcula-
tions. The result, hopefully, is not another polemic in which all workable
speculations are put in their place. Rather, an attempt is made at developing
a calculated strategy in which all bits of available evidence are combined
with due regard for their range of relevance and the confidence with which
they can be accepted. There is, of course, no question of having achieved
such an objective; but there is a chance of eventual success if enough of
us keep trying.

I. RESOURCE PLANNING OF EDUCATION

A. Remarks on "Production Planning"

The term "Resource Planning" is used in this paper to distinguish the set of activities under discussion from what may be called "Production Planning." The latter best describes the activities of educational planning units attached to National or State Education Ministries. Such units deal with the details of physical, personnel, and budgetary planning for incoming enrollments. They time and quantify actions to be taken by other central departments of the Ministry so as to insure their consistency with budgetary constraints, government guidelines or legislative acts, and the requirements of efficient resource use. Much of this guidance is imposed indirectly through the provision to departments of projective and analytical documents. Many central planning offices also supply management and system-planning services to individual districts or institutions.

This paper will not discuss the details of production planning in education for the simple reason that expertise in this area belongs to professional educators, especially educational administrators. It bears emphasizing, however, that A.I.D. technical assistance is probably more productive when it helps countries re-organize their educational production planning apparatus (and, jointly, other centrally administered activities such as textbook distribution, inspection, examinations, personnel promotion, etc.) than when it gives them a capability for broad resource planning in the light of sophisticated manpower projections and imported educational prejudices. It should also be said that, whatever our own achievements in the managerial and administrative fields, it is also true

that we have rather little domestic experience in the kind of pervasive central management of education that characterizes many LDC's. Since many European countries <u>have</u> this experience, we should exhibit greater readiness to use third country expertise in this area.

Some question arises as to whether a subsidiary form of production planning, labeled "Technical Planning", should be identified. The objective of this activity is to assemble available elements of educational research and to discover efficient input-output combinations for standard types and levels of education within the range of potential utilization. This information can be used in the form of timed input-output vectors on the national scale by resource planners for overall allocation decisions. Once a vector has been selected, "technical planners" may translate the specific modes of organization and operation under which it is efficient into practical rules for the guidance of production planners, i.e. rules governing their choice of education processes, pupil-process associations, spatial location and scale of operation.

In practice, the slot to have been filled by "technical planners" in education has been left largely empty. There has been a sustained effort on the part of researchers in educational administration, including specialists in education finance, to gather usable findings from relevant fields of educational research and to provide production planners with workable guide-lines. However, very few of those can be viewed as resulting from thorough comparative analysis grounded in solid emperical results--and this is no wonder given the paucity of usable inferences from educational research. There is a sense, at any one time, and among

educators of a given culture or school, of what is the better way to do things; but the expected outcome of alternative approaches is rarely quantified, and the process by which educational research is translated into professional consensus is by no means systematic. Economists have recently begun to apply their familiar tools to the statistical derivation of 'education production functions,' but first results are disappointing.

It is apparent from the description of what "technical planning" ought to be that the activity does not properly belong in any one of the "prescriptive" planning agencies; it only supplies decision rules at one end and collections of efficient input-output vectors at the other. While nothing prevents either the "production" or the "resource" planning offices from serving as administrative umbrella, the most appropriate place for technical planning is in university 'institutes' or 'centers' linking educators, economists and other social scientists. The rationale for this selection is that technical planning must remain very close to educational research and benefit from sophisticated economic methodology; also, that it has speculative aspects most congenial to academic personnel and academic structures.

It also needs emphasizing that ideal interactions between production planners, technical planners and resource planners are not likely to be realized. Under ordinary circumstances, resource planners neither receive nor return efficient input output vectors. Rather, "planning" decisions take the form of an enjoinment on education managers to process a certain minimum enrollment within a certain maximum budget for each level-type of

education. The job of technical planners--and, at a later stage, production planners--is then to maximize output (weighted sum of final student achievement) within those constraints and those imposed by the market.

B. Dimensions of Resource Planning

The form of educational planning that has developed with large inputs from economic analysis and methodology over the last fifteen years can be characterized as "Resource Planning." The Resource Plan selects a set of activities and prescribes their levels at different points of the planning horizon by specifying their physical inputs and/or outputs. The specified levels are (hopefully) feasible and have certain optimum qualities from the standpoint of the planner's higher objectives. The organizational structure that produces the Plan has no direct role in the administration of the education sector, and its personnel resources comprise mostly economists and statisticians. Ideally, higher policy objectives are supplied by the Chief Executive's office, although the planning group more often must generate objectives on its own by continuous probing of the Government's actions and stated positions. Ideally, again, substantive information concerning the probable outcomes of various activities in education and training is supplied by education and manpower specialists, although planners may have to exercise a good deal of independent judgment and to draw inferences from performance data not usually considered by educators. The role of the planning group in "implementation" consists mainly in selling and explaining the Plan Document, checking the consistency between actions taken by executive agencies and legislated

elements of the Plan, and reacting to deviations by warning of probable consequences and proposing new paths to intended targets.

As under production planning, a subsidiary activity may be identified, this time in the field of "Financial Planning". Such planning does not allocate human or material resources, but selects the best way to provide education producers with the financial means of purchasing inputs. The "best way" refers to the manner in which burdens are distributed in relation to individual rewards. In a majority of cases, however, financing acts as an effective constraint on resource allocation, i.e. there is no feasible way of distributing burdens (through taxation or other means) so as to provide for the purchase of independently "planned" education inputs--or, at any rate, to make education available strictly in accordance with the most efficient matching of human talent and education processes. Sufficient funds for the production of education can only be attracted by some (discriminatory) market pricing of educational services, giving those willing and able to pay a preferential access. A related problem is that of accommodating demand for privately sponsored education--or for locally sponsored public education--in recognition of the beneficial by-products it may procure its clients: in addition to creating distortions in the allocation of talent, the existence of parallel private systems may further affect efficiency by preventing an appropriate spatial distribution of educational activities.

More than any other, this area of the total planning effort has remained constricted by traditional or prejudicial attitudes on the part of finance experts, educators and the general public. It deserves greater

emphasis and a bolder approach within the context of general resource planning.

Although the next sections of this paper will discuss Resource Planning in education in some detail, two remarks must be made at this point.

1. The effectiveness of the Planning group depends on the willingness and ability of other government agencies to, first, participate constructively in the preparation of the finalized "Plan Document" and, later, to implement its provisions. A necessary--although not sufficient-- condition for the Planning group to attract an adequate level of cooperation from all agencies, and later to exercise some control on implementation, is that it be removed from the domination of any sectional organization (e.g., education ministry) and placed under the direct authority of the Chief Executive. This pattern tends to prevail in most LDC's, where educational resource planning is in the hands of a Division of the Planning Board (Council, Ministry), which stands at least as high as traditional Ministries. An additional advantage of the latter structure is that it increases chances of some integration between general development planning and educational planning.

The planning unit of the Ministry of Education, which deals more directly with what we have called the "production planning" of education, should act as a major link between the Ministry and the Education Division of the Planning Board. Although he may find the atmosphere less than congenial, it is important that an economist (or economic office) be incorporated in the planning unit of the Ministry. His main role is that of

"interpreter" between the two groups: education specialists in the Ministry's

unit must understand the intent and substance of central planning directives,

and economists in the Planning Board must have a clear and up-to-date reading

of "accepted" educational technologies. This is the more essential in the

absence of independent "technical planning" units capable of supplying each

side with information that is both consistent and adapted to individual needs.

More generally, it can be said that the staffing of planning organ-

izations is of crucial importance to their success. The problem is not only

one of personnel quality; it is fairly obvious that, if the Planning Board

is a source of sinecures for political proteges of the government in office,

it can only serve as a rubber stamp for the day-to-day fancies of governmental

action. But there is a genuine and difficult option in distribution economists

and educators across the planning structure. While the scheme outlined above

places economists in the "resource planning" office and education specialists

in the "production planning" unit (with an economist-coordinator in the latter),

the proposed division remains less than ideal. The reason, already discussed,

is the dearth of appropriate technological information--itself traceable to

fundamental failures of educational research. In the absence of operational

messages from educators--or from "technical" units linking educators and

economists"--the economist-planner is forced to resort to arbitrary judg-

ments and to introduce them in his models at the cost of substantial

errors. One may wonder, therefore, whether better results could not be attained if the resource planners were educationists who, while skilled in the tools of economic optimization, could draw on the fund of insights and understandings that they carry as experienced professionals. This view has been espoused with some enthusiasm by American schools of Education, and several programs are now operating in our universities for the training of domestic and foreign educators as resource planners.

While professional biases must necessarily affect one's position on this issue, the conclusion we offer is that, for the time being, economists (working with social scientists from other disciplines) are the more appropriate source of personnel in resource planning organizations. Experienced educationists--and the less experienced ones--are not, in fact, ready to subject themselves to the thorough training which the practice of economic planning requires. The training programs in existence give them enough familiarity with terminology, fundamental concepts, and some of the simpler projection techniques of education resource planning, that they may function effectively as interpreters and implementors of the Plan. But their input in resource planning must remain marginal. The greater sensitivity to hidden educational realities that educator-planners are likely to display is counter-balanced by their insufficient grasp of the limits of relevance of available economic tools and by their inability to incorporate related economic and social issues in inter-sectorial analysis. This is not to say that trained economists have been immune to the same weaknesses; but their awareness of them has been greater

and their ability to overcome them is vastly superior.

2.   There has been a clear shift of emphasis in the concerns of
educational resource planners over the last three-to-four years. The
shift is more apparent in academic writing on the subject than in the
practice of planning, but it is urgent that it be translated into sus-
tained policies of the LDC's. Briefly, it has been recognized that the
integration of educated or trained individuals in the active labor force
represents a more pressing and more difficult problem than the production
of these individuals in accordance with some calculated schedule. First,
even the best "manpower-need" projections are subject to substantial
errors, with the result that serious gaps may develop between actual job
openings and the number trained toward each job category. Similar dis-
crepancies will occur when education-training outputs are determined by
reference to "rates of return" in alternative channels. Secondly, the
forces of popular demand, reflected in a variety of political pressures,
generate a growth of (at least) first-year enrollments in successive cycles
of general education that greatly exceeds "manpower needs". Third, the
drain of educational resources caused by "social" demand, together with
a general tendency of planners to underestimate qualification requirements
of teacher-trainers, result in a quality of educational outputs that falls
significantly below the standards required for highest productivity, or
even below those implicit in manpower projections. Fourth, the system
of incentives (salaries and living conditions) is such that large sections
of the educated seek employment away from the areas intended for them

under the Plan. Altogether, therefore, a situation is created in which major areas of activity remain unproductive because of insufficiently trained manpower, while a substantial portion of the educated labor force is either unemployed (rural immigrants to cities) or grossly underemployed.

Under usual definitions, underemployment occurs when the type and level of training that the individual has received qualify him for a position of higher productivity than the one he actually holds. For the purpose of measuring human and social damage, however, the concept must be extended to all situations in which substantial disparities in job status and earnings are observed among persons of equivalent qualification. The presence of such disparities is not always an indication of inefficiency, but it carries a high social cost of denied expectations. A good deal of LDC's underemployment is, of course, "illusory": While some graduates are not employed at the level which their school degree would lead them to expect, the quality of training which this degree represents would not qualify them for a more demanding position than the one they hold.

While these maladjustments tended, at first, to be blamed on faulty projection techniques (even when no serious projections had, in fact, been attempted, or when educational development had proceeded quite independently of earlier manpower-education plans), there is a growing consensus to the effect that much of the problem arises, on the one hand, from the faulty quality of educational outputs and, on the other, from major imperfections of the labor market. More will be said on both subjects in the next two sections of this paper. What bears emphasizing at this point, however, is

that the concern felt by planners in these areas is not matched by any
kind of solid body of analysis and factual information.

C. Planning for Quality

On the quality front, conventional wisdom has generated a standard
improvement kit which includes improving the basic education, training,
and socio-economic status of teachers; reforming curricula especially in
the sciences; generalizing the comprehensive school at the secondary level;
providing better textbooks and teaching materials; reforming the examina-
tion system; transferring the bulk of training in the trades and middle
technical jobs from the classroom to the shop or laboratory; liberalizing
the structure and increasing the average size of higher education institu-
tions; etc. But there are those who feel that modern curricula and teach-
ing methods must be set aside in early phases of educational development,
until the level of sophistication of both teachers and families has increa-
sed sufficiently; there are those who place their hope in the intensive
use of modern materials and television programs as a way, partly, to by-
pass the teacher; there are those who wish to vocationalize education
right from the primary grades; and there are some who suspect that weak-
nesses of staffing and organization could plague on-the-job training pro-
grams just as much as they have technical and trade schools. The problem
is that very little cost-benefit information is available concerning these
options, not only in the context of specific LDC's where they would be
implemented, but even in the more advanced countries where one or another
has been adopted. In any case, much of the failure to raise quality has
to do with the inability of most LDC's to control enrollment expansion

and to budget accordingly for education. The political formula by which
either or both of these variables can be made consistent with quality
requirements has not yet been found; and the arrival upon the scene of
foreign aid advisors who, because of manpower craziness or unflinching de-
votion to their national ideals of universality, will always find some
educational cycle in which enrollments should be brought up tc par, does
not improve the situation.

Whatever the prospects may be in this regard, planning for "quality"
will remain an essential activity, and it is well to keep in mind the
following suggestions and warnings:

(1) Whatever the urgency felt by planners, and considering that
early attempts at raising quality are likely to be frustrated by expan-
sion pressures in any case, priority should be given to systematic pro-
grams of local research on the performance of alternative educational
techniques. The necessity is not for fundamental research in learning
processes--although some important cultural deviations from western norms
may have to be identified--but for sample studies of results attained by
varying combinations of educational resources available locally. This
means, for instance, systematic comparisons of primary school achievements
attained with teachers of different levels of general education and train-
ing (especially the levels now prevalent in the country), in combination
with different teaching methods, materials, and equipments, and with
children of different social backgrounds. It means systematic experiments
with various combinations of formal technical instruction and on-the-job
training, as practicable in the country's farms and factories. It means

sustained analysis of the performance of pilot comprehensive schools, in comparison with schools of the traditional pattern <u>in which equivalent staff, curriculum, and equipment improvements have been made</u>.

This is asking for a great deal, especially in view of the failure of advanced countries (including the U.S.) to carry out much of this sort of educational "engineering research." But LDC's can ill afford the waste of resources represented by generalized innovations, when these happen to be both expensive and ineffective. The tendency of our education advisors, carried straight from the domestic scene, is to measure their performance by the rate at which they achieve change, rather than by the objective results of the change they have promoted. There is need to overcome this attitude and to promote engineering research on a priority basis.

To repeat, the research required is of the "field experimentation" type and it must concentrate on the interaction of inputs in the education process. Particular care should be exercised in the promotion of substitutions involving say, TV instruction with low-grade instructor - supervisors, or a highly trained monitor - teacher with low-grade assistants, in place of traditional (if modernized) input combinations. With respect to the second proposal, one may find a shortage of the sophistication required of all parties concerned in the areas of professional relations and organization. Concerning TV instruction, a superficial examination of the available evidence suggests that no thorough evaluation of such systems in LDC's has ever been attempted. It also appears that, where success has been claimed, large quantities of technical aid was available in the form of field personnel more highly qualified than local "qualified" teachers. This casts some doubt as to whether undereducated teachers

would indeed manage to deal effectively with course contents, teaching methods, and communication procedures far beyond their own level of sophistication. What is needed is an evaluation of the progress of pupils under ETV systems <u>operated with locally feasible personnel structures.</u> Until then, it should not be assumed that educational results are a continuously increasing additive function of TV time and teacher qualifications so that less of one can always be made up by more of the other. It may well be that a high level of teacher qualification is required before TV can make a significant contribution.

More generally, the promotion of techniques (such as programmed instruction) meant to by-pass the school teacher presents substantial dangers. While it is evident that the process of raising the level of general education and training of teachers already employed is bound to be a slow one, it is also clear that the effort should not be given up and, even more important, that new recruits with better qualifications should not be thwarted in their professional aspirations. Even though the programmed material could be master to the poor teachers and slave to the better ones, there is some danger that the typical central administration in LDC's would impose uniform use in all classrooms. This would tend to retard even further the time when school teachers acquire any kind of professional stature and commitment. The resulting inefficiency--not likely to be revealed in experimental situations--could easily negate all potential advantages of the new technique, however "teacher free" it may be.

(2) A common pattern of educational plans concerned with quality

improvement is that the upgrading of teaching and training activities
they propose to achieve is mostly in terms of increased teacher-pupil
ratios and increased proportions of teachers holding appropriate degrees.
No problem arises in this respect as long as the higher degree (or higher
training level) required is not the highest along the relevant track;
i.e., it is generally possible to find (or quickly produce) more secondary
graduates to work in elementary schools, more college graduates to teach
secondary schools, more full Ph.D.'s to staff colleges, etc. This sub-
stitution produces qualitative improvement not only by providing a "longer"
educated teaching staff but, in the long run, by also improving the
education that teaching staffs received from higher up.

On the other hand, post-graduate instruction cannot be improved
simply by having more of the older post-graduates teach the younger ones:
A more talented and more knowledgeable breed must first be developed from
among the group. Similarly, engineering training cannot be upgraded simply
by doubling the number of inept engineers on the teaching staff: A super-
ior strain of engineers must be made available. The problem of creating,
retaining, and structuring this superior talent, especially at the top of
the various education pyramids, is the one which "quality" planning must
solve.

The creation of the new pool parallels that of the previously mass-
produced body of educated personnel. The latter normally grows first in
response to immediate pressures for essential manpower and for politically
acceptable levels of general education. Although a cost-benefit analysis
of this evolution has not been carried out, it is probable that the rapid

initial development of a low-quality education meets the requirements of efficiency. In view of their low capital-output ratios (in terms of human stocks and flows), education systems have a capacity for very rapid internal growth, even while pouring a large part of their output into the rest of the economy; on the other hand, the very long "incubation" period leading from young child to, say, college graduate results in correspondingly long delays in accelerating growth; and such acceleration requires a temporary reduction in the flow of graduates out of the education system. Countries are thus faced with difficult options in the early phase of their educational development, when more than the available educated manpower is needed to staff newly created administrative, technical, and primary-teaching jobs, while much of the same personnel is required in secondary and higher schools if educational growth is to meet existing and incoming demands. A temporary compromise has to be achieved through general understaffing (in number and qualifications), and educational quality, in particular, suffers. Eventually, the high growth potential of education reasserts itself; a situation thus develops where the system is capable of producing--and often does produce--a surplus of educated manpower but continues to operate under the low-quality standards established earlier and perpetuated by inferior teaching staffs at all levels.

The same initial tensions must be expected when, after basic quantitative needs have been met and the greatest gains in general productivity can be obtained through personnel upgrading, an attempt is made at developing a superior class of manpower. Highly trained and experienced individuals are scarce and in demand outside the education system. The process

must, therefore, start with a small number of them, with help from imported
teacher-trainers and foreign training centers, and expand no faster than
the requirements for (a) sustained quality and (b) external manpower needs
will allow. However, in spite of the smallness of the initial nucleus
(and the time required in setting up a balanced pipe-line), low capital-
output ratios keep operating even in "high-quality" education and may
quickly overcome early bottlenecks; if the superior system "conserves"
enough of its produced manpower, the achieved growth rate should be suffi-
cient to "displace" the earlier educational structure within less than
two decades.

The policy that emerges from this analysis is by and large that
attached to the creation of "centers of excellence." It is pursued at
one level or another by a number of countries, although often clouded by
errors and misapprehensions. It is probably wrong, for instance, to
attempt this type of development before what may be called the "first
wave" of educational growth has been completed. Until then, the country
has a more urgent need of quantitative increases in graduates, and educa-
ted manpower has not reached a sufficient mass to produce the minimum
nucleus of superior personnel required for "quality" growth. Again, the
policy is likely to fail if "centers of excellence" are viewed only as
show places for the inspiration of local emulators; rather, they must, at
first, be created and expanded within the framework of an integrated growth
plan, with a constant upholding of quality standards and with a system of
final examinations and degrees that clearly differentiates their products.
Much of the expansion will, of course, take place through existing institu-
tions getting accreditation under the new standards. But no step should

be taken to dilute those, or to prevent the selection by new-type institutions of the highest aptitude stratum among graduates of the previous cycle. The problem is, first, to create a substantial body of high performance individuals; later, those will be available to staff lower grade institutions and to start raising educational quality across the board.*

The final equilibrium will, no doubt, involve a lasting duality, with an upgraded network of "standard" education serving mostly students of less-than outstanding aptitude (in their chosen field), and a network of "elite" education at all levels that will supply, among other needs, those of education itself. But such a hierarchical structure has worked in the development of many now-advanced countries, and it may be the one best suited to conditions in many LDC's (see further down). It is apparent, at any rate, that little success can be expected from attempts at by-passing the quality pipe-line and concentrating the effort on a general upgrading of students at some intermediate level, e.g. pre-university stage. The demand of a majority of those seeking higher education is for a degree, and they will not easily accept the imposition of new hurdles on the way to their objective. It is wiser to give them what they want and to let the better prepared and more ambitious minority acquire a differentiated training (and degree) along the "quality" ladder.

*It goes without saying that the development projected in the above paragraphs will not take place unless, as the per-capita income grows, larger fiscal (or direct) transfers are made to the education system and continuing controls are exercised on its quantitative expansion. If not, the "elite" educational track will grow slowly upon itself, delivering most of its products to sectors other than education and subsisting side by side with a permanently dismal network of mass education.

A further determinant of efficiency is the extent to which the selection operated by the education system from the pool of qualified individuals at each stage brings forward those likely to achieve at the highest level. If the selection is loose or, worse, biased in favor of undesirable candidates, those reaching positions of leadership or responsibility will perform below realistic expectations, while those of higher merit left behind may experience destructive frustrations. Even though documentation in this area remains poor, it is apparent that developing countries suffer enormous losses of "developed talent" due to failures of the educational selection process. A major element of the failure is the practical elimination from educational advancement of the great majority of rural children, whether or not they squeeze their way through local elementary schools. A second element is the near-monopolistic access of children of the well-to-do to secondary and higher education. A third element is the prevalent mix of teaching resources and examinations, which tend to promote hard working memorizers. The thoroughly mixed bag that eventually emerges in the upper or middle strata of the Establishment should thus come as no surprise.

The remedies are as obvious as they may be painful. Elementary education in rural areas deserves higher priority than educational planners have been willing to grant it; from the present standpoint, it should at least be capable to identify promising pupils and to provide them with access to secondary education. Access to secondary and higher education should be more strictly on a merit basis, with a system of grants, fee remissions and loans applicable to all institutions, both public and private. Finally, further progress should be made toward improved teaching materials, teaching techniques and examination procedures, although much has already been accomplished--with our help--in this area.

D. Planning Labor Market Integration

With respect to labor market maladjustments, economic thinking is still
cautious and uncertain. The apparent market failure manifests itself in the
large rural-urban drift of minimally educated rural youth or families seeking
an urban employment that does not materialize, attracted by relatively high
urban wages that do not fall in response to the unemployment pressure. It
shows up again in high salary differentials along the job ladder, sometimes
explainable by relative scarcities (as in some newly emerging African countries),
but more often traceable to historically and politically determined government
wage scales or, at the higher levels, to pressures of the international labor
market. In the more educationally advanced LDC's, administrative and clerical
government jobs draw both students and graduates away from supposedly starved,
but relatively underpaid, occupations in technical fields, as well as from less
comfortable or prestigious public services (teaching, nursing, agricultural
extension) where pay is tied to minimum educational requirements without re-
ference to occupational desirability. The system is further pervaded with
underemployment (although much of it is illusory), as the extra talent and
sacrifice required to reach the next higher educational qualification always
looks small in relation to the salary differential it _might_ procure. In the
end, a large portion of those qualified for a given level of occupations fail
to gain employment at that level--following a selection process that is at
best random but often perverse--and accept jobs for which they are overqualified
(in title at least). Meanwhile, the size of government budgets available for
public services such as education, public health, agricultural extensions, etc.,

remains limited; the only way to live within these limitations is to keep salaries, and therefore minimum educational requirements, low; and recruitment consists largely of unsuccessful candidates for other careers who often barely meet formal qualification standards.

While these phenomena have received at least superficial analysis and documentation, the research record remains very spotty. Furthermore, the matter of developing feasible policies to remedy the situation seems to have overtaxed the imagination of development economists. One of the better analysts,[1.] after underlining as a central proposition that

"the extensive damages that the perversities of the wage structure in some African countries have and can cause (sic) seems . . . to make reform of the wage structure the central issue for manpower and perhaps for development policy in Africa for the next five to ten years,"

goes on to examine a series of conceivable policies, only one of which (revision of upper salary scales in the public sector) deals directly with the wage structure and is quickly dismissed as unpracticable. He does, however, incidentally bring up the matter of civilservice salary scales and their tendency to tie salary levels uniformally to minimum education qualifications. This, indeed, is an area where reform is eminently feasible although it must, of course, be accompanied by some reordering of budget priorities.

Apart from this, there is little a government can do in the way of direct restructuring of wages if it wishes to retain a measure of social peace and civil-service loyalty. Furthermore, wages may be distorted by reference to

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1. Robinson G. Hollister, Jr.: <u>Manpower Problems in Africa</u>, prepared for the African Bureau, A.I.D.

available supplies in each manpower category, but not so when individual
supply behaviors are considered. In a general context of poverty and
economic frustrations, special incentives are required to insure the re-
sponsible exercise of their duties by educated persons. The importance
of this "responsible exercise" resides in the controlling or supervising
nature of many "educated" jobs, and the entrusting of valuable assets
(commodities, documents, goodwill) to educated employees. Those elected
to jobs of given level of responsibility will thus be paid more than
others of equivalent qualifications for whom room could only be found at
a less responsible level--in spite of whatever pressure the latter may
exercise on the higher jobs.[1] This extends to employed workers of the
lowest education level who, clearly, cannot be made to work at a zero
wage (the marginal productivity of this category) and who will not be
stabilized in a job unless they receive at least a family subsistence.
It would follow that the existence of substantial wage differentials between
persons of similar qualifications competing for the same jobs does not
necessarily reflect irrationalities in the wage structure.

Finally, it should be noted that the low wages paid--and low quali-
fications required--in the "starved" public services do not constitute
evidence of market distortions. In school education, they faithfully re-
flect public demand for large enrollments and public unwillingness to spend
too much for them. The same can probably be said of the relatively low

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1. To the extent that achieved levels of education are taken as an index
of individual responsibility, the more responsible jobs tend to require (and
command) higher levels of qualification.

wages offered graduates of technical and vocational schools in the indus-
trial sector: Their productivity may be very low in combination with poorly
trained engineers and managers and in the absence of well organized on-the-
job training. The problem, in all cases, is not that wages are miscalculated
but that, objectively or subjectively, the labor involved is not worth much
to its users (private or public employers).

(1) If little can--or need--be done with respect to observed wage
structures, it is apparent that existing tensions in LDC's labor markets
must be attacked on a different front. Beginning with the rural-urban
drift, the flow of undereducated migrants must be stopped at the source
by improving employment incentives in the rural milieu or, alternatively,
special efforts must go in providing additional employment opportunities in
the city.

With respect to rural retention, experience would indicate that the
agricultural vocationalization of primary and lower-secondary schooling
in villages has little impact; on the other hand, vocationalization may
complement other measures and provide a supporting structure for extension
work among adults. Among effective measures, in land-rich countries, the
best answer is offered by land redistribution or settlement under coopera-
tive (including credit) arrangements, with preference given to young adults.
Elsewhere, to the extent that success is first met in raising per capita
production and creating a surplus over subsistence needs, rural employment
in supporting services can be generated through training and provision of
adequate credit facilities. If the local leadership, together with the
rural civil-service infrastructure (from teacher to tax collector), can

be helped in developing adequate social services and, even more important,
a pattern of socially integrating organizations and activities, the effect
on retention should be substantial.

It is fairly evident, however, that few of those developments are pos-
sible unless, first, a rather dramatic rise in productivity is achieved by
adoption of new production techniques. Whatever the difficulties of sel-
ling technical progress to uneducated, tradition-bound farmers and community
leaders, priority must be given to agricultural technical aid over rural ed-
ucation and social reform. Unless farmers can begin to breathe, nothing will
break their present despondency and the flight to the cities must probably be
viewed as the lesser evil.

A substantial urban migration will take place under the best of circum-
stances, and a fairly obvious requirement of LDC's planning is to select
activities (i.e., technologies) in which the surplus labor can be absorbed
productively. In spite of much wringing of hands on the part of development
economists, existing manpower models (whether deterministic or optimizing)
uniformly fail to allow for capital-labor substitutions in individual sectors--
although some permit substitutions between workers or different levels or
types of training. It is true that important labor substitutions are effec-
tively carried out by LDC's (e.g., construction, services) and that local
manpower planning normally incorporates the resulting patterns. But little
effort has gone into examining labor substitution possibilities in the more
"modern" sectors, perhaps because the high labor coefficients which these
industries exhibit in relation to more advanced countries (without a cor-
responding reduction of the capital coefficient) discourage any consideration

of additional labor inputs. The fact that inefficiencies raise the labor require-
ments of production should not blind planners to the possibility of efficiently
replacing some elements of the physical capital by more workers. However tight
the limits of substitution, we should at least support a serious effort of the
LDC's to discover what these are.

In the end, LDC's will continue for some time to share the following character-
istics: per capita production remains extremely low; some minority is lucky or
talented enough to land a job and is bribed into doing it well by owners of scarce
capital and holders of political power; and there is little willingness on the
part of the privileged to relinquish any of their advantages. When the minority
is large and its surplus is substantial, progress may result from a revolutionary
social reform which transfers incomes through the creation of jobs in collective
services of doubtful economic productivity. If the minority is small, such transfers
would make little difference to the mass of incomes and the loss of incentives in
the "active" sector might prove disastrous. An uneasy stability may be retained as
long as the privileged class manage to absorb new products of secondary and higher
education and a substantial number of the primary educated, while keeping the urban
labor surplus alive through the (charitable) purchase of personal services. This
equilibrium will be upset, however, if the educated cannot be integrated or if the
pressure of population becomes such that minimum subsistence cannot be insured.

(2) At the middle level of manpower, the only promising ways of relieving
the frustrations of underemployment are, on the one hand, a better control of
enrollments and, on the other, actions intended to modify student expectations.

The political difficulty of keeping a lid on enrollments in general
education and (at the higher level) in the "soft" specializations was brought
out earlier in the discussion of education quality. It is less difficult to
adjust the output of technical and professional schools to expected demand. A
short experience will suffice to indicate what proportion of the graduates will
respond to existing market conditions by actively seeking employment in their
area of preparation, what proportion will not be able to find employment else-
where, and what proportion of their requirements employers will prefer to draw
from alternative sources (on-the-job training of individuals without formal
technical training at the required level). This information is enough, in
association with manpower "need" projections, to plan intakes and enrollments
under existing market conditions and educational processes.

However, besides the fact that many (though not all) of the "turncoats"
will be underemployed in relation to the levels of education they received, it
is difficult to take for granted the resource waste involved in highly expensive
technical education when a large proportion of its graduates make no direct use
of it. Short of binding technical-professional students by contract, there is
no simple administrative way to guarantee a high rate of graduate retention in
this area of training. Nor is the answer to be found in a narrow specialization
of the curriculum: The graduate's effectiveness and adaptability to future labor
markets might be reduced far more than his immediate opportunities. In the end,

progress can only be achieved through joint policies that (a) make the products of technical-professional education more desirable to employers and (b) make the jobs for which they are prepared more desirable to graduates.

A joint condition for the realization of (b) is that the level of general education required before acceptance in the technical program not be so high that the schooling level of graduates gives them better opportunities in alternative occupations. [1] With respect to (a)--and, by implication, (b)--the problem differs as between professions where employment can increase through substitutions (industrial and commercial sectors) and those in which employment is mostly determined by final demand for the service produced (teaching, nursing, etc.). In the first case, a reform of technical school products and, if offers improve substantially, increase student willingness to respond positively. This shift in employers' demand could be not only quantitative, but also qualitative, in the sense that they would employ technical-professional graduates at their intended level rather than in lower qualifications (e.g., engineers doing the job of technicians or technicians working as production assistants). In the case of teachers and other public service workers, chances for improvement depend almost entirely on the form and magnitude of public demand for their services. While technical change in school education could conceivably result in the employment of fewer (better trained) teachers at higher salaries, the realistic

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1. This does not contradict the apparent consensus in favor of maximizing the general education content of any one's educational career. General education should be maximized subject to (1) enough specialization courses being taken to meet immediate employer's expectations and (2) the above condition being satisfied.

assumption is that large enrollments will continue to require more teachers than education budgets can support at anything but low salaries. The exodus of trained teachers toward alternative occupations will, therefore, continue to be high; and it may get worse if--in accordance with our advice--general education requirements of teacher training colleges are raised, but budget stringencies make it impossible to adjust teacher compensations accordingly.

Since only limited success can be achieved in reducing underemployment, and since its main social cost resides in the frustrations it engenders, serious thought must be given to the possible manipulation of student and graduate expectations. The problem arises whether student expectations are "justified," in that their preparation does qualify them for a better job, or whether they rest on a "degree" that fails to live up to its name (what was earlier called "illusory" underemployment).

In either case, relief could best be obtained through the establishment of a strictly controlled hierarchy of degrees, which leaves no one in doubt as to where he stands along the education ladder. To make the degree hierarchy effective in the labor market and, at the same time, improve the efficiency of personnel selection, labor practices should develop in the following directions:

    (1) salary schedules specified in terms of job descriptions rather than minimum required education;

    (2) a hiring policy under which personnel may compete for talent and place heavy weight on formal educational achievement in their evaluation of new recruits to the labor force;

    (3) a promotion policy within and between agencies that places only minimum reliance on formal educational achievement.

It will be noted that, except for the original proposition, these
conditions correspond closely to U.S. practices and represent a major
departure from civil-service traditions (if not private sector ones) in
the majority of LDC's. By contrast, the proposition concerning a strict
degree hierarchy will be viewed as a reinforcement of much deplored tend-
encies toward degree worship and educational caste building in those same
LDC's. The contention offered here--and it is controversial enough to re-
quire further analysis--is that the liberating and efficient features of our
own personnel practices are to be found under (1), (2), and (3) far more than
in our informal bestowing of all-purpose degrees at the expiration of a few
lengthy standard cycles.

The fact is that our personnel officers do refer to a tight continuum
of educational achievements which is based, not on standard examinations and
degrees, but on a weighted evaluation of degree granting institutions and
various internal rankings including teachers' evaluations. There are many
reasons why this type of scale cannot be used in LDC's. One is that many
systems are nationally (or regionally) centralized and strive to provide
fairly equal education in all institutions of a given cycle; another is
that the risks of nepotism, public intimidation, and corruption make the
use of less formal--or less centrally controlled--evaluation instruments quite
undesirable; a third is that the social structures of many countries are,
indeed, built on a collective identification of individual roles and that
whatever our advisors' prejudices, they should attempt to exploit existing
cultural patterns before thinking of destroying them.

The suggestion is thus for more examination (and degree) levels in the
course of existing cycles,[1.] and the creation of a dual system of "regular"
and "elite" schooling, with separate entrance and degree examinations, in
upper secondary and higher education. This accords, incidentally, with the
requirements of quality upgrading discussed earlier: If quality must be built
through the parallel--and somewhat independent--growth of a better qualified
teaching body, starting from the small available core of highly qualified trai-n-
ers and selecting the best available student input to maximize the growth rate,
elite institutions are bound to appear in the process. The point is that there
should be no attempt to disguise this elitism, as it becomes clear that graduates
of such institutions enjoy a near-automatic advantage in the labor market. The
larger message is that we should not confuse color and substance when we attempt
to spread our own democratic ideals.

(3) High-level manpower partakes of the problems of its middle-level
complement, and most of the suggestions developed in the previous subsection

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1. This requirement is now met, in part, by a large production of
drop-outs at successive stages of the cycle. While this is a valid method
of supplying an identifiable hierarchy of educated manpower in a system
based on standard instruction and examinations at large time intervals,
it remains that the identification is of poor quality and that the usual
integration of curricula over the complete cycle makes early interruptions
almost totally wasteful.

are applicable. The more specialized set of issues has to do with the international scene, whether they concern the use of "expatriate" personnel, student training abroad, or the so-called "brain drain."[1]

E. Concluding Remarks: Need for Sociologist Participation

By way of concluding this chapter, one important remark should be addressed to the problem of personnel selection in planning. It was suggested earlier that economists (and other social scientists) are in a better position to devolop resource planning in education than are educationists. The point to be made here is that the "other social scientists" have been too far removed from the planning scene. It is apparent from the discussion carried out in the previous pages that a good number of the problems associated with labor market adjustment are mostly sociological in nature. What community structures will "hold" young people in rural areas, what social outcomes can one expect from present patterns of in-city migration, what social and human damage may result from educated underemployment, how sensitive are student career expectations to alternative systems of educational and job promotion, and how is social change affected by them . . . all are questions to which economists are not particularly well equipped to give answers.

There are, of course, development sociologists. The difficulty is that, traditionally, sociologists have been hesitant to enter the arena of social engineering, i.e, the construction of policy models toward the accomplishment

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1. This area will not be analyzed within the present paper, as it is now the object of systematic study and research on the part of Dr. Michel Hervé of AID/PPC.

of stated objectives, partly because they lack confidence in their empirical results and partly, it seems, because they are still unsure of their "scientific" status and do not wish to spoil their record by introducing value systems in their analyses. There should be a systematic effort on the part of planning agencies (and university programs in educational planning) to attract sociologists and "sell" them on the value of policy research. There is evidence that the teaming up of economists and sociologists (e.g., Bowman and Anderson) results in a far richer (if not always more sober) analysis than what economists alone can produce. It may be, indeed, that interdisciplinary work is the best possible avenue for economists to imbue their colleagues in the social sciences with an "engineering" viewpoint and, perhaps, with some of their methodology.

The potential contribution of sociologists extends beyond the social subsystems that their empirical investigations have rendered familiar to them. One of the most sensitive policy areas is concerned with means of creating desirable life patterns in a context of low real incomes. This comes up most strongly with reference to the unskilled labor force, whether underemployed on the farm or unemployed in city slums. But the problem of settling middle-level workers in undesirable locations and at relatively low salaries is even more crucial from the standpoint of economic growth. More specifically, ways must be found of maintaining a motivated body of school teachers, agricultural extension workers, cooperative managers, community development leaders, etc., in rural areas, in spite of the marginal salaries imposed by fiscal constraints. It is not unlikely that major advances could be made by regrouping all such professionals in larger centers, where they

could promote--and share with others--a new array of community activities,
enhance their professionalism, and, jointly, develop into a local "public
service" bourgeoisie, with its own status and social comforts. Whether
this represents a valid approach or not, there is little doubt that pro-
fessional and social isolation constitute one of the main barriers to the
staffing of rural services and that it must be overcome by means other than
massive salary increases.

II. TECHNIQUES OF EDUCATIONAL RESOURCE PLANNING

An Evaluation and Attempted Re-Direction

A. An Outline of Standard Educational Planning Practices

The planning exercise consists in a number of steps which are fairly
standardized at this point.

One element is the computation of manpower stocks needed over time in
sectors other than education, based on empirical manpower coefficients in
each sector of activity and on projected growth by sector. By reference to
initial manpower stocks, this is followed by some estimate of the flow of
newly "certified" individuals required over time to satisfy (non-teaching)
manpower needs. To the numbers thus obtained are added complementary pools
intended to cover accidental leakages within and out of the labor force,
as well as some of the public demand for educational attainment beyond that
required for labor force participation.

The next step is the "enrollment need" computation which, by reference
to the education sequence leading to specific attainment levels, expected
attrition rates within education cycles, standard pupil-teacher ratios, and
standard teacher training requirements, calculates enrollments by year and
by program to generate no less than the required flow of persons with
appropriate educational attainments. A parallel step in this sequence is
a quality and cost-effectiveness speculation which generally concludes in
favor of improved teacher training, higher teacher salaries, more expendi-
tures on equipment and supplies (especially textbooks, blackboards, and
science laboratories), school consolidation, modernized curriculums with

higher science content, establishment of comprehensive secondary schools,
vocationalization of programs at several levels, integration of formal
technical education with on-the-job training, and reform of university
structures. If spirits are high, the standards derived from this analysis
are introduced in a second round of manpower- and enrollment-need computa-
tions, thus providing another limiting option.

The remaining steps of the exercise are less straightforward, as they
represent a series of compromises with unfortunate constraints. In countries
at an early stage of manpower resource development, the first finding is
that the stock of trained people and students "in a pipeline" at the start
of the planning period is not sufficient to staff and fill the schools or
training programs scheduled under the "enrollment need" computation. Both
these countries and those at a more advanced stage of educational growth
are also likely to find that the financial implications of the original plan
are beyond the fiscal means of the country. This results from a dual analy-
sis consisting, on the one hand, of a financial costing of proposed education
programs over time and, on the other, of a projection of maximum contributions
to be expected from the public and private sectors. In general, the private
share is projected as stable or declining, while the public share is deter-
mined by reference to national income and budgetary trends, with the help
of two magic numbers setting the due level of educational expenditures in
relation to, respectively, GNP and total government budget.

In any case, original enrollments and "quality" standards must be
revised downward, sometimes drastically so, and the pattern is fairly

predictable. Because the growth of enrollments is politically more difficult
to control, the inputs necessary for quality upgrading (or sustainance) are
first sacrificed. In addition, the "cheaper" areas of education are allowed
to flourish at the expense of the more expensive ones. Original enrollment
projections are also reduced, generally with a bias against lower levels
of education (which have the least connection with identifiable manpower
needs, and where cuts affect the least powerful elements of the population).
In the last resort, the plan is stretched by assuming unrealistic future
budgetary allocations to education, the hope being that lower budgets will
go hand in hand with much lower manpower needs than were actually assumed.

B. Ranges of Sophistication in Manpower-Education Planning

Although, as will shortly become clear, the "manpower and enrollment
need" routine should integrate itself into a larger "optimization" model
subject to initial stock constraints in the education system, it often makes
good sense to compute "needs" independently at first. The next subsection
presents a somewhat idealized version of the computation, which, besides
providing a reference for less sophisticated applications, integrates itself
rather efficiently in certain optimization programs.

1. Consistent, Dynamic Computation of Manpower and Enrollment Requirements

a) Preliminary Projections - General Planning Model

The routine starts with a projection of production in each activity
sector other than education, and a specification of minimum enrollments (or
graduations) over time by broad cycles of education. The latter is not func-
tionally related to manpower needs but refers to expected benefits from

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education in the form of personal growth, social integration, cultural enrichment, etc., or, more directly, to an insistent public demand for education which is partly based on <u>expectations</u> of better employment opportunities.

The projections are normally those developed within the country's General Plan, and thus represent some "best" choice among alternatives. The objectives (appropriately weighted) which enter into such planning generally include steady growth of private and public consumption, building-up of capital stock for growth beyond the planning horizon and desirable patterns of income distribution. The field of feasible achievements is restricted by available capital resources at the start (and natural resources beyond), as well as by the projected size and productivity of the labor force. The general planning model specifies the manner in which resources can be absorbed in the production of desired goods and services, together with some related mechanisms of income distribution. To the extent that the details of occupational requirements and educational activities are not incorporated in the planning model, the following characteristics result:

1. The projections of labor force and labor-force productivity represent preliminary independent estimates, based on trend extrapolations of both domestic and foreign experiences.

2. Ideally, education activities (enrollments) are specified by broad levels in two steps:

(1) an independent "manpower" projection of enrollments roughly related (through international experience) to projected increases in total

labor force and productivity,

     (2) an adjustment of "manpower" enrollments up to the "social
demand" requirement wherever they fall short of that level.[1]

The absorption of physical resources and labor (both as teachers and
working-age pupils) by these activities is then treated on a part with
similar utilizations in other sectors.

     3. The choice of income distribution structure remains unrestricted
by the need of sustaining given occupational distributions.

     b) <u>Computation</u>

Based on the specification of manpower "coefficients," showing labor
stocks required in each occupation per unit of production in each sector,
the routine starts with a projection of manpower stocks needed over time
to satisfy planned growth in sectors other than education. This informa-
tion is translated into required additions to the non-educational labor
force in each period, first by occupational category, then by level and type
of educational attainment. The correspondence established between occupa-
tions and educational attainments is based in part on observed associations
in the country and in part on projections of changed educational requirements
in response to planned increases in labor productivity. <u>Enrollments needs
are then obtained through solution of a large system of stock-and-flow balance
equations repeated over each period.</u>

     The typical "production" equation states that total enrollment in any

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1. The practice, however, has more often been to extrapolate enrollments
consistently with social demand, with little reference to the implicit
requirements of assumed productivity changes.

program-year of education is the sum of:

a) requirements next year for persons completing that year;

b) attrition over the year.

The typical "utilization" equation states that requirements for persons completing a given program-year are the sum of next year's flow requirements for persons of that educational attainment into:

a) the non-teaching labor force

b) teaching and allied services (whether graduates enter the profession directly or replace experienced members of the labor force transferring to teaching)

c) further education

d) frictional pool

e) inactivity

The system of equations is easily restated in terms of periods (usually a common average length of standard cycles) rather than years.

Concerning the terms listed in the flow equations, labor force flow requirements are those computed earlier for each period, modified by projected death and retirement losses, and by temporary withdrawals of experienced members for re-training or child-rearing (taken as a fixed proportion of the active labor force in each occupation-sector class).

School personnel flow requirements are similarly expressed, after stock requirements in each period have been specified as the sum over all education programs of enrollment time, the personnel/pupil ratio (in terms of personnel of the relevant attainment).

Flow requirements in further education are expressed as a sum of first-

year enrollment requirements in programs to which access is (assumed to be)
limited to persons of the given attainment.

The _frictional pool_ is produced in response to the observation that,
even when maximum (tolerable) controls on student admission, promotion, and
placement are exercised, students processed through a program-year or cycle
will not distribute themselves into further activities (occupations and
educational tracks) in strict accordance with requirements.[1] For manpower
requirements to be strictly fulfilled, a surplus of "career bound" individ-
uals must be produced at each educational attainment to (a) cover the loss
of graduates to jobs classified as requiring different educational attain-
ments, and (b) ensure a high probability of adequate intake in all jobs of
the relevant attainment and all programs of further education.

The frictional pool is expressed as a fixed proportion of the three
requirement flows (labor force, teaching, and further education) at each
educational attainment. Note that, whatever shift may be taking place
between occupations at the same general _level_ of (required) educational
attainment, a number of individuals equal to the size of the pool must even-
tually find occupations at a lower level or go inactive. [2] This can be
taken into account by (a) specifying an "active surplus" equal to a fixed
proportion of the frictional pool and (b) introducing a "transfer matrix"

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1. The mildest form of such controls is enrollment by priority of male
applicants. At the other extreme, a policy of strict enrollment control for
manpower purposes would impose continuing education and work contracts on all
incoming students. Even then, however, discrepancies would always arise between
planned and actual manpower needs, at least by occupational categories; if the
cost of experiencing shortages is less than the cost of carrying surpluses, the
best strategy would call for the production of a contingency reserve at all
levels of educational attainment.

2. The surplus created for further education will not swell enrollments in
"preferred" tracks as long as the number of places made available is controlled;
it will, instead, become available for the labor force.

which specifies the proportion of the aggregate active surplus at each _level_ of educational attainment which each common (required) attainment group of occupations at lower levels is likely to absorb. For this purpose, the various attainments specified in the model must first be re-grouped by _levels_, and appropriate empirical investigations be conducted concerning inter-level transfers. Flow requirements in the utilization equations are then reduced by a series of negative terms, each a given proportion of the aggregate active surplus at some higher level of educational attainment.

The _inactive_ outflow appears as a residual under a constraining decision to produce certain minima of education in response to legitimate social demands. Such production is not tied to manpower requirements, and it may consciously deliver educated persons in excess of such requirements. However, the indirect productivity of wives and mothers is often adduced in support of the social objective, and some of the demand is tied to job expectations which, in the aggregate, the system cannot satisfy.[1] Social demand is usually specified only at the primary and, later, secondary levels and is expressed as a fixed proportion of relevant age cohorts. If preliminary computations indicate that other flow requirements for persons of the corresponding educational attainments will fall short of social demand, the sum of terms in the relevant "utilization" equation is replaced by the social demand flow requirement. If not, the "inactive" requirement is left out of the equation.

Note that, in either case, it is assumed that controls on admissions, promotion, and placement are so adjusted as to satisfy flow requirements in

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1. Social demand of _labor force participants_ for education beyond occupational requirements can be satisfied by specifying appropriate educational attainments for stated proportions of each occupational category.

the labor force and in further education. However, because of the propensity of individuals to seek employment and, furthermore, to seek it at the highest level compatible with their educational achievement, the surplus of candidates when social demand exceeds other flow requirements will be higher than that calculated as "active surplus" for the strict satisfaction of manpower needs. The surplus to be distributed among lower level occupations (see above) must therefore be calculated as a sum of the "intended" active surplus and a term proportional to the residual inactive flow.

If solved, the system determines all relevant stocks and flows throughout the planning period, <u>including minimum stock requirements of teachers and pupils across the whole education pipeline in the initial year</u> and of first grade pupils in following years. Clearly, such requirements may or may not be satisfied in reality. If they are, as would in general be true if the plan does not contemplate drastic accelerations of growth and the educational system has developed moderate surpluses in relation to the initial economy, the computation will have provided a feasible educational plan at moderate cost. If they are not, as can be expected in the case of ambitious growth planning by newly emerging countries, adjustments must be made toward a feasible solution; and it becomes a matter of doubt whether the original computation should, in fact, have been undertaken.

2. Simplified Versions

With every few exceptions,[1] enrollment need projections actually carried out always operate under much simplified versions of the technique just

1. Indirect evidence suggests that the technique outlined under (1) was followed in the "London School" manpower and enrollment projections developed for India (Mosher et al.). See: Report of the Education Commission, Delhi, 1966.

outlined. It is only in more ambitious optimization models that the proposed system of equations (re-interpreted as non-strict inequalities) is incorporated in full.

One simplification consists in drastically reducing the number of non-education sectors in the economy. This may go all the way to a specification of growth in terms of a single aggregated sector.

Another simplification (e.g., Thailand projections) consists in referring to population--rather than economic--growth, under the assumption that manpower needs will develop in relation to population according to established historical patterns.

Another simplification (e.g., Tinbergen-Corea model) consists in by-passing manpower coefficients and expressing needs for persons of various educational attainments directly in terms of sectorial or national output.

Another simplification (e.g., Mediterranean Project, OECD) consists in first computing enrollment needs without reference to the education and training of teachers, then to compute teacher stocks required over time to support those enrollments and, thus, additional enrollments needed to produce teacher-stock increments. Since teachers are, in turn, needed to support the additional enrollment, the computation should be repeated in a series of iterations until marginal increments become insignificant. Convergence appears to be rapid, although the detail of successive iterations has been poorly documented in studies of this type.

Another simplification (e.g., Mediterranean Project, OECD) consists in doing a rigorous projection of educated stock requirements only for the terminal year of the Plan (or a close subsequent year) and in distributing

stock increases (and corresponding enrollment sequences) on some ad hoc basis between the first and the terminal years of the Plan. As long as the projected growth is not too de-stabilizing, simple trial-and-error procedures can be used to derive a consistent sequence of educated stocks and enrollments; however, the initial state of the education system may impose a pattern of slow growth of the educated labor force in the first years and quick acceleration beyond, which is not necessarily consistent with other constraints imposed on the economic growth path.

Another simplification (e.g., Tinbergen-Corea model) consists in considering only constant rate-balanced growth situations, starting with the initial year. The rigidity of such a model tends to identify substantial shortages (and surpluses) in the initial education pipeline, which would not occur under more realistic growth patterns. The model has been of great help in improving our theoretical understandings, but it is of little use in practical education planning unless so modified and refined as to bring it within the class of optimum growth models described further down.

Although much can be - and has been - written on the subject of each of those variations, the discussion can be summarized by saying that, given adequate data, the more completely specified model should give better results than any of its simplified versions but that data (and computational) limitations justify the choice of whatever variation best utilizes available degrees of freedom.

3. Constraints, Options, and Objectives

Whatever its original merits may be, it was pointed out that the manpower-enrollment need computation easily results in specifying initial requirements

which are simply not met by the system. Furthermore, after the financial costs and physical resource requirements of the projected enrollments have been calculated, it often appears that the financial means jointly available from fiscal, philanthropic, and family sources will not be sufficient, or that the physical requirements (especially construction and equipment) cannot be met without substantial resource reallocation among sectors.

(a) Feasibility

These apparent limitations are not all of the same nature. The first represents a plain physical impossibility; the initial enrollment plan is simply not feasible and the economy must, somehow, make do without it. Assuming that the manpower coefficients used in the computation are <u>strict</u> requirements for production in any sector, that postulated educational attainments are <u>strict</u> requirements for functionality in any occupational category, and that assumed educational sequences are <u>strict</u> requirements for reaching each educational attainment, some of the nation's original objectives must be sacrificed, either in the form of a lower (or different) growth of $\overline{GNP}$[1] or in the form of a reduced satisfaction of social demand for education.

The only hope of avoiding cut-backs is a discovery that <u>alternative</u> means of staffing and educating are available, and that all targets can be met when such alternatives are used. While the range of known technical options does not appear wide enough to permit a complete resolution of manpower shortages in all countries, some of the available alternatives can at least <u>reduce</u> the gap between maximum objectives and actual possibilities. The most

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1. $\overline{GNP}$ = GNP net of the value of educational services.

obvious of these alternatives, and the ones most widely utilized, are the use of "expatriate" labor, both in teaching and in other sectors, and the training of students in foreign institutions. In either case, the problem can no longer be viewed as a straight, deterministic projection of what must be done. Choices must be operated, either among alternative staffing and training patterns to achieve original targets or among such patterns and alternative levels of each objective (GNP growth and satisfaction of social demand) to maximize aggregate benefits.

(b) Income distribution

The second limitation is not insuperable since, however massive the expenditure called for by the enrollment projection, it will not usually represent more than a fraction of national income. The emergencies of an "expenditure" problem cannot, in fact, be understood without reference to the larger problem of income distribution, an element of which is the transfer of income to government budgets for the provision of public services. To the extent that the pattern of (after tax) income distribution emerging as a result of the manpower-enrollment projection differs from that assumed in the General Plan, the original calculation of net social benefits must be revised, and plans must be re-adjusted toward optimality.

Even before considering tax transfers, it is fairly obvious that new information concerning income distribution will emerge from the manpower-enrollment need projection. While some broad distribution assumptions are normally made in the course of developing the country's General Plan, the actual income distribution, under most existing systems of compensation, is largely determined by the occupational structure of the labor force. Such

a structure cannot be fully known until completion of the manpower-enrollment need projection. Furthermore, each alternative staffing and training pattern contemplated in the search for consistent overall plans (first limitation) will generate a different distribution of occupations and, therefore, incomes. The associated net benefits (positive or negative) must be added to those already identified before valid comparisons can be made between feasible options.

For a complete formulation of the income distribution problem and a full evaluation of social benefits, reference must be made to the following considerations:

- First, income distribution is not fully determined by the occupational structure. It is not only that those who control land or capital have a claim on the associated returns; the more important factor is that a broad discretion remains to government in regulating and influencing wages, taxing business incomes before wage distribution, taxing or augmenting personal incomes, and making available collective services, consistently with the achievement of a given occupational (and sectorial) distribution of manpower. The combination of disposable income and available collective services which results for any individual or family is thus very much influenced by government actions of a fiscal and regulatory nature. It follows that (a) income distribution patterns must eventually be evaluated in terms of disposable income and collective services available to each group, and (b) additional choices must be made concerning alternative fiscal and wage policies, with the joint objective of satisfying occupational manpower requirements and

maximizing benefits from improved income distribution.[1]

- Second, an important element of the distribution evaluation is the extent to which pupils from families of different socio-economic complexions have different access to education and, therefore, different career opportunities. Unequal opportunities may also be associated with ecological, social, tribal, or religious differences. Attempts to overcome such inequalities by provision of universal free education, or by financial assistance, are partly neutralized by the application of another criterion of desirable distribution; i. e., the freedom of each family to spend its income as it sees fit, which includes freedom to spend on the education of its own children.

- Third, and most important, the expressed will of the public to have a broad access to education is not matched by a willingness of the middle and higher income groups to pay their "due" share of the corresponding cost through fiscal channels. One reason for this reluctance is that their tax contribution to general public education could purchase high quality education for their own children in the private sector. There is thus a high political cost[2] to governments of attempting the large fiscal transfers required for effective mass education. While some of these considerations may have been incorporated in the General Plan, with corresponding adjustments

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1. If certain "optimum" principles of taxation and collective service distribution have already been determined, income distributions can be evaluated by strict reference to before-tax incomes.

2. It must be kept in mind that so-called social costs and benefits do not lend themselves to independent "scientific" measures. At the operational level of national planning, they eventually take the form of evaluations by

of the amounts of "social demand" allowed to be served, one common result of
subsequent manpower-enrollment projections is to (1) bring out the necessity
for increased levels of teacher pay and training and (2) determine higher
requirements than previously assumed, at least in higher education and in
technical fields of training. This means that the financial--and especially
fiscal--burdens of education are often much higher than the figures
registered under the General Plan. Available options must, therefore, be
re-opened. Since, furthermore, the political cost of providing poor and
inexpensive education is low (as long as abundance prevails), the eventual
"optimum" will tend to sacrifice little in the way of total enrollments but
much in the way of education quality and, depending on the sensitivity of
productivity to quality, $\overline{GNP}$ growth as well.

(c) Physical Resources

With respect to the third limitation, it is again not uncommon for
the physical requirements derived from manpower-enrollment projection to
exceed substantially what had been estimated under the General Plan. This

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national decision makers of costs and benefits to themselves, whether by
reference to selfish appetites (effect on one's political future and income
position) or to moral and esthetic satisfactions (contribution to increased
national wealth, to more equitable patterns of income distribution to a
social structure freer of tensions and violent disruptions, etc.). The
process of arriving at such personal (or group) evaluations requires objective
estimates of the expected reactions of various social groups to the conditions
they face (based on observed behavior), as well as a degree of empathic
internalization of each group's feelings (based on assumed uniformities of
the human condition). These evaluations must, in any case, be translated by
planners into appropriate value weights on the various relevant outcomes of
examined policies.

is all the more likely to happen when no allowance for the utilization by education of construction, equipment and other supplies was made in the General Plan. There has been a wide tendency among planners to treat resource diversions to education as negligible from the standpoint of potential economic growth. It is difficult to tell whether this assumption is the result of actual estimates or whether it reflects the absence of good data on the material input-vectors of education. The fact that, in some countries where measures are available, education absorbs up to 10 per cent of the total investment in construction, suggests that it is unwise to proceed along this path. Explicit account must be taken of the physical resource needs of education and plans (within and outside education) must be readjusted if their feasibility is threatened by the calculated requirements.

The main lesson of this review is that the manpower-enrollment projection technique, in whatever form it is applied, rarely results in an educational plan which the sponsoring country may consider as final. Even when none of the listed limitations is operative, the possibility remains that labor productivity could be increased all around by different distributions of educational attainment across the labor force. The rate of productivity increase and the set of occupational-educational "requirements" may have been chosen with due reference to the most relevant foreign experience available; but different manpower structures are conceivable and could, under the specific conditions of the country, result in improved performance. When the limitations <u>are</u> effective, and planning is taken seriously enough

not to ignore or gloss over them, there is no escaping the need for a more or less systematic investigation of possible growth paths under all recognized constraints and in the light of all recognized opportunities. The extent to which the traditional manpower-enrollment need computation may still constitute a useful step in this investigation will be discussed in the next sections.

C. Adjustment of Education Plans Toward Consistency and Social Optimization

1. Full Optimization Models

The most straightforward way of attacking the systematic investigation of feasible alternatives is to set the problem in a "programming" form, for which mathematical methods of solution are available. After all constraints arising from the initial state of the economy, all possible activities leading from relevant inputs to relevant outputs, and all value weights attached to outcomes of interest have been described in appropriate form, such programs systematically explore feasible combinations of activities (i.e.,of their levels of operation) and select a particular combination which maximizes net benefits.

Models which attempt this kind of exercise for all activities in the economy are extremely rare, partly because computer costs and computer capacities impose a reduction of the problem's dimensions (through aggregation or suppression of activities), and partly because few economists have the stomach to take responsibility for errors in all areas of the economy all at once. It also happens that, historically, planning and planning establishments operated at first without detailed consideration

of human investments, and eventual manpower-education planners had to hook up their enterprise to the output of the "general" planning group. The best known "universal" model is that developed by Irma Adelman, and its author still views it as somewhat of an experimental venture. This, at any rate, appears to be the consensus of potential users, for there is no known case of operational education plan based on direct optimization of the joint set of all economic activities. There is little question that such models will eventually prevail. However, few countries have dared depend on a comprehensive programming computation to determine activities in their traditional areas of planning. Until comprehensive optimization programs become operational in the traditional context, there is little chance of their succeeding with the added complication of a detailed education sector.

2. Partial Optimization Models--Bowles Model

The model developed by Sam Bowles and applied by him to Nigerian and Greek educational planning differs in some radical ways from the class of structures described so far. Rather than letting his "programs" deal with the whole set of original activities and constraints, Bowles assumes that, over the planning horizon, the contributions which individual members of the labor force will make to GNP are well approximated by the earnings of similar workers at the beginning of the Plan. The principle behind this approximation is that earnings established in a competitive market economy reflect what each worker contributes in association with the rest: Employers cannot pay him more than he adds to the value of the firm's production without losing profits, and they cannot pay him much less as long as other firms are competing for his services. This contribution is called "marginal

productivity" by economists; marginal productivity varies greatly among members of the labor force but, <u>under the conditions assumed in classical economic models,</u> it is the same for all individuals endowed with equivalent qualifications.

To maximize any combination of annual $\overline{\text{GNP}}$'s over time, the model only needs to refer to activities and constraints in the field of education. The generation of a "human output" at any level of qualification creates (a) a $\overline{\text{GNP}}$ <u>addition</u> equal to the relevant "reference earnings" for the remainder of the individual's active life [1] and (b) an associated $\overline{\text{GNP}}$ <u>reduction</u> consisting of:

1. $\overline{\text{GNP}}$ contributions foregone by the individual in each year of his education (earnings lost by student),

2. $\overline{\text{GNP}}$ contributions foregone by teachers in giving their time to education rather than to direct $\overline{\text{GNP}}$ production (alternative earnings of teachers), and

3.   physical resources absorbed in the individual's education (physical resource costs).

The resulting program for maximization of net benefits is capable of handling a considerable detail of educational activities since it is not over-burdened with activities and constraints in the non-education sectors. Furthermore, the computation is freed from the uncertainties concerning alternative manpower and education "requirements" in production, being based on observed market outcomes which are likely to reflect the true potentials of educated manpower in the given country. Various constraints may be

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1.   Corrected for labor-force participation.

incorporated in the solution to reflect observed institutional rigidities or to satisfy certain limiting objectives which are not incorporated in the computation of net benefits.

There is no point in reviewing all of the various criticisms which can be addressed to the Bowles' formulation, since it is affected by one very fundamental weakness. Observed earnings, besides having no clear-cut relation to marginal productivity in situations where government wage scales dominate the labor market and underemployment is rampant, only measure, in any case, what additional members of the labor force can contribute to $\overline{\text{GNP}}$ in association with the existing manpower structure. There is no reason to expect that marginal productivities at each level of education will remain constant while substantial changes occur in the relative (and absolute) sizes of variously educated groups. What is generally known of production structures suggests that, as a category of labor increases relative to the rest, the relative marginal productivity of its members tends to fall; and this is reflected in a lowered relative market price (earnings) for their services.[1] If so, differential earnings at the outset of the Plan cannot supply valid measures of marginal contributions to $\overline{\text{GNP}}$ under the widely different manpower structures contemplated in the course of optimization.

International comparisons suggest that relative earnings of different labor categories do not differ substantially among countries, in spite of great variations in relative category sizes; but this uniformity, when it

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1. The drop occurs even though production is reorganized by shifting to technologies and product mixes which utilize more of the newly abundant category.

is not the result of wage practices which have little to do with marginal
productivity,[1] is of earnings which are determined within each country by
relative labor scarcities and specific production structures. As a result
of common trends in economic development and individual adjustments to
international trade opportunities, countries with more educated labor tend
to produce more of the goods in which educated labor is productive, so that
earnings and marginal productivities of the educated remain high (because
of high demand) even as their supply increases. This does not mean, however,
that higher education should be provided to all children everywhere: There
must be an optimum of higher education associated with the production
structure of each country, one beyond which the marginal productivity of
providing such education would be less than the cost. This principle is
nct destroyed by the observation that demand and supply for each level of
educated manpower seem to balance out at the same relative level of earnings
in most countries.

The trouble with the Bowles' model is precisely that the assumed fixed
productivities of each educational attainment class do make for "optimum"
solutions in which eveyone should receive a uniformly high level of educa-
tion. Assuming that educational costs - as well as benefits - are constant
for each attainment class, the net benefit and benefit-cost ratio of
additional educations in each class will also be fixed; in the absence of
constraints specific to some of the classes it is obvious that total net
benefits will be maximized by giving everyone the education in which benefits

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1.   See Chapter I for an outline of wage determination in LDC's.

(productivity) are highest relative to costs. This tendency is overcome at first when costs and benefits are discounted, thus making education in the early years of the plan relatively costly, and when specific constraints are introduced concerning the dependence of educational growth on the initial education pipeline (including teacher stocks) and on standard activity sequences leading to various educational attainments. But the universalist principle eventually prevails: In Bowles' computation of an optimum path for Greek education, the high benefit/cost ratio of general secondary education inevitably leads to enrolling all primary school graduates into "gymnasium" by 1971, upon which the system responds to the next higher set of rates and enrolls all high school graduates into higher education. Although reported results do not make a full assessment possible, it is not unlikely that the plan would soon call for specialization of all higher education students in engineering and allied subjects. Such results, if not totally absurd, can at least be said to carry disturbing implications.

It would seem, then, that a Bowles' model will eventually let some dominant benefit-cost ratios pull the system toward extreme (and untenable) options-unless, of course, enough "institutional" constraints are introduced from the start to nearly determine the outcome. The main question is whether the path determined for the early years of the planning period--when initial constraints are still effective in retarding access to extreme positions-- remains a good approximation of the optimum. There is a good chance that it is, especially for countries at an early stage of development in which the initial structure of educated stocks may effectively constrain the first ten or twenty years of the plan. This, however, can only be established

through systematic sensitivity analysis, by trying a wide range of alternative productivities (or productivity sequences) and, hopefully, observing that the early stages of the solution remain unaffected. On the other hand, such a finding would also support the use of alternative objective functions which (a) are less dependent on marginal productivity measures and (b) explicitly include objectives other than $\overline{GNP}$ growth. Some suggestions to this effect are presented in section D.

3. Rate of Return Planning

It goes without saying that rates of return based on marginal measures of investment costs and benefits remain excellent tools for sub-optimal decisions, i.e. decisions in which "value endowed" variables have small enough a range within the potential solution domain that unit costs and benefits (imputed from the larger system) can be taken as constant. The field of potential application is extremely wide, especially in the area of "technical planning", i.e. determination of efficient production patterns by level and type of education. However, users of the rate of return should be constantly reminded that (a) the rate is only a proxy--simple (interest free) but treacherous--for the actual parameter emerging in investment decision models, i.e. the marginal (discounted) cost/benefit ratio; and (b) the proper cost (and thus benefit) entering the ratio must be selected by reference to the relevant constraint effective in the implicit decision model.

D. Priority Optimization

The class of optimizing models to be presented in this section is the one most congruent with traditional manpower planning. Since the models make use of manpower plans as a starting point, they draw on resources and expertise already developed in a number of LDC's. Furthermore, their solution can be approximated by some of the "long-hand" adjustment techniques described in the last section of this chapter. Finally, some of the proposed formulations incorporate many of the conclusions developed earlier concerning education quality and labor market integration. Their only shortcoming is that they have yet to be implemented by anyone.

1. Basic Model

Priority optimization starts with the simple notion that a "manpower need" computation based on (a) conservative assumptions concerning required educational attainments, (b) conservative projections of expected $\overline{GNP}$ growth, and (c) no requirements on the "social demand" account, will always be consistent with initial stock conditions in the education pipeline or, at the very least, be feasible through imports of "expatriates" and temporary exports of "students abroad" at tolerable levels.

The approach, then, consists in maximizing certain benefits, subject to the condition that the stocks of "educated" individuals required over time to satisfy $\overline{GNP}$ manpower needs in a "conservative" computation are, in fact, generated. The optimization operates under a full set of constraints associated with the educational structure. These reproduce the system of equations listed under (B) in the full "enrollment need" computation, except that the "production" equations are replaced by inequalities stating

that flow requirements next year out of a given program-year **plus** attrition cannot be larger than enrollment.[1] However, several important modifications are made concerning manpower utilization:

(1) Flows into inactivity are no longer fixed but constrained to be non-negative. A "complement" at least equal to the irreducible "frictional flow" must therefore be covered by the educational outflow. The "surplus" distributed through the "transfer matrix" to occupations of lower educational requirements is expressed as the sum of the "active surplus" (proportional to frictional flow) and a term proportional to the "inactive flow."

(2) Another major modification, tied to the model's concern with social demand and employment, is the decomposition of educational sequences into male and female tracks. The "production" and "utilizations" relations are thus written separately for males and females, and flow requirements into the teaching and non-teaching labor force are equated to the **sum** of relevant male and female flows. Separate counts are also taken of male and female stocks in the labor force, and appropriate rates of labor force withdrawal are applied to each. The transfer matrix and proportionality coefficients used to determine "frictional flow", "active surplus", and total distributed surplus, are also specified separately. (Females will have a /generally/ much higher frictional flow coefficient, but much lower surplus coefficients.)

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1. Recall that the balance equation can be modified to deal with "periods" equal to average cycles instead of years.

(3) Finally, stock requirements for teaching and non-teaching personnel, are reduced by the introduction of two "expatriate" variables, and separate education programs are specified for study abroad (with no human inputs from the system other than students and an output level which reflects "brain drain" propensities).

Note that the system could be "opened" further by allowing for recall into the labor force of persons originally placed on the "inactive" list. For instance, flow requirements for new-graduates into the labor force, instead of being computed strictly by reference to stock requirements next year and active stock in the present year (modified by death, retirement, and temporary withdrawals), could be reduced by a fixed proportion of the inactive stock. More subtle adjustments to demand-supply conditions can be affected under the series of iterations proposed further below.

The benefits whose sum is to be maximized, and their relationship to variables of the model, can be listed as follows: /Note that the most logical "unit of value" in the objective function is a dollar of $\overline{GNP}$ consumption; all value weights assigned to variables in the function are thus estimates of how many dollars of national consumption the national decision maker would trade off for one unit of the variable./

a. Satisfaction of social demand for education. Relevant variables are the number of individuals reaching specific levels of educational attainment in each of the planning years. The numbers are entered into the objective function with value weights reflecting their relative desirability; however, if the latter varies substantially in accordance with the proportions

obtained, the numbers at one level of attainment (say, secondary graduation) may be constrained in the model to be no less than a certain proportion of those at another (say, lower primary graduation). Further adjustments can be made if different weights are placed on male and female education.

b. <u>Physical resource cost of education</u>. This cost is computed in the model as a linear function of enrollments (cost of supplies and services) and additions to enrollment (capital costs) in each program. The amount incorporated in the objective function is the difference (positive or negative) between computed costs and education resource costs assumed in the General Plan. Such deviations are assumed to affect only consumption (public or private) and are entered in the objective function (with a negative sign) at their dollar amount.

c. <u>Fiscal transfer cost of education</u>. The fiscal cost is computed in the model by (1) calculating the total annual cost of education and (2) subtracting expected private contributions. Total annual cost is expressed as the sum of physical resource cost (above) and personnel costs, the latter resulting from a multiplication of compensations by number of personnel in each category. Expected private contributions are expressed as the sum of expected gift and endowment income and net tuitions paid by students. The first element may be given an independent trend and the second is expressed as a proportion of total costs in each program (see below). The difference between computed fiscal costs and those assumed in the General Plan is entered in the objective function with a negative value weight which measures the political cost of each additional education dollar drawn from taxpayers.

d.   Foreign exchange cost.   The foreign exchange cost is obtained by
multiplying the numbers of students abroad and expatriates in the labor
force by their respective average annual cost in foreign exchange. Terms
proportional to the capital cost of specific education programs should be
added if an import component is expected. A negative weight--reflecting
the country's marginal evaluation of foreign exchange--is applied, either to
the aggregate of disbursements after converting in dollars or to separate
currencies if their relative valuations differ from exchange rates. If some
foreign exchange disbursements for education and manpower were assumed in the
General Plan, the cost to enter is the difference between computed and assumed
disbursements. In any case, the exchange valuation is determined on the
assumption that disbursements will be marginal enough to affect only imports
of consumption goods.

e.   Underemployment and unemployment cost.   The model computes under-
employment and unemployment for males only. Male underemployment is measured
for each level of educational attainment as the difference between number of
employed males of that level of attainment and number of males employed in
occupations requiring that level of attainment. Male unemployment is
measured for each level of educational attainment as the difference between
male labor force of that level of attainment[1] and employed male labor force
of that level of attainment. Given the downward transfer of surpluses
through the "transfer matrix", underemployment will normally affect levels
of attainment between the highest and the lowest, while unemployment will be

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1.   The male labor force at any level of attainment is obtained from the
     original stock by adding annual outflows at that level of attainment
     and subtracting: (a) outflows into further education, frictional
     and inactivity net of distributed surplus, and (b) losses through
     death, retirement, and temporary withdrawals.

concentrated in the lowest. However, the transfer matrix can assign some

of the surplus at each attainment level to the same level, thus allowing

unemployment for those who "will not loose rank."

Separate negative weights are assigned underemployment (or underemploy-

ment at different levels of attainment) and unemployment in the objective

function. Since female under- or unemployment is not penalized, the model

will always give preference to male employment. However, the social

preference for women in some occupations (e. g., nursing, infant care,

medical care of women patients in some countries, etc.) can be made effec-

tive by specifying an extra-benefit of women employment in those occupations

(with a coefficient larger than the cost of male unemployment). Alterna-

tively, minimum percentages of female employment in the same occupations

can be entered as constraints.

f.   Discounting.--While different weights may be applied to objective

variables in different years of the planning period--reflecting, for

instance, different expected levels of fiscal or foreign exchange stringency--

no systematic time discount is called for since investment opportunities

are directly affected by none of the variables. Some small discount may,

however, be in order, if the social utility function--or that of the

national decision maker--is assumed to be non-neutral with respect to time.

2.   Limits and Potential of the Manpower Priority Model

Choices in the above model are essentially limited to the distribution

of education, taking the satisfaction of pre-specified manpower needs in

non-education sectors as a must. Choices are oriented toward the maximi-

zation of a weighted sum of benefits (positive) and costs (negative) arising

out of the national distribution of education, by reference to satisfied social demands, physical resources costs, structure and size of fiscal transfers, foreign exchange costs, and levels of unemployment or under-employment.

The proposed specification is in direct response to the "new" concerns expressed in the first chapter of the paper. It does, however, fail on one account at least: educational quality is not subject to options, being "frozen" in the original specification of educational input-output structures and of minimum educational attainments for each occupational category. This means, in particular, that potential $\overline{GNP}$ increments over the amounts originally "planned" cannot be entered (meaningfully) in the objective function, and also that large potential effects on the objectives already considered are not allowed to take place.

It is probable that, in the first decade or two of economic and educational development, the specification of low-quality manpower and education structures is appropriate, i.e., is identical with the one which an optimizing model allowed to select among alternatives would, in fact, choose. Assuming, for the sake of simplicity, that the general rubrics under which educational attainments are classified are independent of "quality", we can describe any manpower unit (for purposes of educational planning) in terms of a standard educational attainment class plus an index of quality. It can further be suggested that, for practical purposes, the quality index should be reduced to two levels: high ($\underline{h}$) and low ($\underline{l}$), corresponding, respectively, to "developed" western standards and to "emerging" LDC

standards. Although the empirical picture is still extremely blurred, it would appear that a shift from $\underline{l}$ to $\underline{h}$ qualities across the board will reduce labor coefficients (<u>specified for standard attainment classes</u>) in each sector, and that the promotion of $\underline{h}$ educational attainments is much less a matter of changes in educational sequences (order and length) than of improved teacher and material inputs(especially teachers of $\underline{h}$ attainment). Given the high social demand for education (expressed primarily in quantitative terms), not only can it not be satisfied under $\underline{h}$ standards--partly because of fiscal stringencies and partly because of the scarcity of both materials and $\underline{h}$ personnel--but a large proportion of educational outputs would be redundant (unemployed or grossly underemployed) if productivity was increased (and requirements correspondingly lessened) by $\underline{h}$ educational attainments.

The assumption underlying this analysis is that manpower is not the bottleneck of early growth, i.e., that, however unproductive their labor may be, emerging LDC's can provide enough $\underline{l}$ manpower to maximize product in relation to other available forms of capital. This position is not contradicted by the presence of underutilized capacity in LDCs' agriculture and, at times, in their emerging industries. Under appropriate organization-- including sufficient incentives to attract capable staff into rural community development and agricultural extension services--capacities would quickly become activated. Failures of organization can, indeed, be blamed on inappropriate attitudes and understandings on the part of all decision agents, but it is not clear that the amount of high-quality education which

the system could deliver would make much of a dent in the prevailing
pattern, or that it could make it quickly enough to affect general produc-
tivity in the relevant period.

3. Iterative Model with Quality Adjustments

There is little doubt, on the other hand, that actions affecting
quality become eventually relevant; and the only way to establish whether
they are or not is to compare potential results under alternative "quality"
policies.

The main problem in this connection is one of information. As suggested
earlier, we have little knowledge of what alternative manpower structures--
described in terms of specific h and l educational attainments--can produce
in each sector in combination with specific (non-human) capital structures
and supplies. Systematic international comparisons are available concern-
ing labor coefficients by occupational category and by sector in a large
sample of countries, but the work has not been extended to classes of
educational attainment. Were this done, observations would be mostly
restricted to l-attainment labor in association with "underdeveloped"
capital structures and to h-attainment labor in association with "developed"
capital structures. Only to the extent that some sectors (or portions of
sectors) in LDC's have capital structures similar to those (or some of
those) in advanced countries, could firm inferences be made concerning the
impact of a shift to h educated manpower by LDCs. Furthermore, there is
strong evidence to suggest that advanced countries keep "upgrading" jobs
in response to rising educational attainments in the labor force, without

much reference to educational costs and productivities; in all likelihood, educational attainments in many occupational categories could be reduced substantially with only a slight drop in productivity. LDCs may thus waste a large effort in education if they take labor coefficients observed in advanced countries as "efficient" under $\underline{h}$ attainment.[1] Finally, efficient ways of structuring $\underline{h}$ manpower may exist side by side with whatever vector is implicit in the practice of advanced countries, and many more technologies are conceivable when $\underline{h}$ and $\underline{l}$ manpower are mixed.

However serious the information gap, it is not insurmountable. The following subsections outline a methodology for the derivation of alternative technologies based on "extreme" manpower and capital structures observed across the international scene. The corresponding manpower and education "quality" options are then introduced in an expanded model, and the selection of a "best" education plan is eventually made by reference to a truly comprehensive account of social objectives.

(1) Extreme sets coefficients: labor inputs (by standard educational attainment) and educational inputs

   a) Generalized $\underline{l}$ attainment

Labor coefficients under generalized $\underline{l}$ attainment are those used in the original manpower priority model. The coefficients should be based on observed manpower structures in the planning country for sectors already developed, and on observations in countries at the nearest possible stage of educational development for sectors not yet developed. The bulk of

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1. i.e., by assuming that any reduction of some of the coefficients without corresponding increase in others would result in a loss of product.

workers in any one occupational category[1] will not ordinarily distribute themselves between more than two (contiguous) _levels_ of educational attainment. The lower of these two levels should be taken as standard (required) for that occupation unless it covers less than 2/5 of the total. The _specific_ educational attainment required for the occupation should be that of the largest common attainment group at the selected level of attainment.[2]

Educational input requirements should be those observed in the planning country for educational sectors already developed, or in countries at the nearest possible stage of educational development for sectors not yet developed. However, identified inefficiencies capable of early correction should not be incorporated. This means, for instance, that observed input structures should be modified to reflect such reforms as consolidation of schools, improved textbook distribution, etc., whose immediate impact is less to raise quality than to reduce unit costs. Similarly, reforms required to achieve even the minimum quality implied in projected manpower requirements (e.g., teacher training programs, curriculum changes, provision of minimum equipment and supplies) should be reflected in the specification of educational inputs (and, if necessary, educational sequences).

b) _Generalized h attainment_

Labor coefficients under generalized _h_ attainment can be obtained from the observation of manpower structures in more advanced countries,

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1. The estimates can be done by occupation-sector class, rather than by occupational category, if appropriate data are available.

2. However, if that attainment group represents less than half the total, the attainments of the two largest groups should be required in the same proportion as those two groups are to their total.

with special reference to European and Japanese data.[1]

An effort should then be made to identify major areas of labor-for-capital substitutability in each sector and to compute the alternate set of labor coefficients at all levels of attainment when the capital-labor ratio is reduced (through substitutions) to the level observed in LDCs.

Educational input requirements in the production of h attainments should be those observed in the same advanced countries, including absorption of h-educated students (beyond the primary cycle) and utilization of h-educated teachers in any h cycle.

(2) Growth comparisons under alternative quality policies.

In line with the accepted principle of separation between general and educational planning, the next step consists in preparing revised versions of the General Plan under alternative assumptions concerning the growth of h attainment in the labor force. For this purpose,

(a) the choice of h attainment growth patterns is limited to alternative constant growth rates of the number of labor force members with h attainment;

(b) planned (optimum) economic growth is calculated for each alternative rate of h attainment growth, with reference to a production function in each GNP sector which relates output to (a) capital stock, (b) amount of labor with l attainment, and (c) amount of labor with h attainment.

Assuming that a structural form of the production function can be specified with only three free parameters, the function can be determined for each sector by reference to the three points identified in the previous

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1. The U. S. experience may incorporate an excessive amount of job upgrading.

section:

1. Observed sectorial output in the reference LDC, with its actual manpower (assumed entirely of $\underline{l}$ attainment) and its actual capital stock;

2. Observed sectorial output in the reference advanced country, with its actual manpower (assumed entirely of $\underline{h}$ attainment) and its actual capital stock;

3. Estimated sectorial output with $\underline{h}$ attainment manpower and a capital/labor ratio equal to that in the LDC.

The revised general plans maximize benefits under their purview (benefits connected with $\overline{GNP}$ growth) and distribute labor between $\underline{h}$ and $\underline{l}$ attainment in each sector, for each alternative $\underline{h}$ attainment growth contemplated.

(3) <u>Educational Plans under alternative quality policies and comparison of total net benefits.</u>

For each alternative $\underline{h}$ attainment growth and each corresponding "best" general plan, an educational plan is computed to maximize the net benefits associated with objectives of the "manpower priority" model. These net benefits are added, in each case, to those generated by the general plan,[1] and the best "total" plan is the one for which the sum of net benefits is maximized.

The educational plan is derived in each case through application of the "manpower" priority model with appropriate modifications:

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1. Note that the benefits associated with $\overline{GNP}$ growth in the general plan, as opposed to those maximized in the manpower priority model, are calculated under standard time discounts.

(a) Two parallel education sequences are specified, one with h and one with l attainment, flowing into two corresponding stocks of labor in each standard attainment class. Initial stock availabilities are also specified in terms of l and h attainment, the h attainment stock having emerged through training abroad and residual success in local education. Educational sequences may be similar in each system, and physical inputs may or may not differ; but h education requires teachers of h attainment and, beyond the primary level, student inputs of h attainment.

However, l education is assumed to produce an "accidental" residual of h attainment people equal to a fixed proportion of the total output in each program-cycle. Together with h attainment members the initial stock, expatriates, and foreign educated (all assumed of h attainment), they provide the needed "seed" for systematic production of h educated people across the planning period.

(b) While education activities are assumed to utilize either or all h or all l teachers, labor of both h and l attainment can be mixed in the production of other sectors. Total stock requirements of h and l attainment labor in each $\overline{GNP}$ sector are specified by the general plan for each year (period). Sectorial requirements of labor by standard attainment class are then expressed as:

(1) $\quad n_i = h'_i . H + l_i . L + s (h_i - h'_i) . (H+L),$

where H is the required h labor in the sector, L is the required l labor, and the coefficients h'_i, h_i and l_i are percentages of the sector's labor in standard attainment class i under the three alternative manpower-capital structures identified earlier: h'_i under generalized h attainment and a LDC

of alternative capital-labor ratios.[1]

(c) A fraction of the "surplus" of h attainment workers is absorbed in jobs requiring their own standard attainment, and displaces a corresponding number of l attainment workers at that standard level of attainment. Those are added to the "surplus" of workers absorbed in occupations requiring a lower standard level of attainments.

Under these new specifications, the manpower priority model will determine a complete education plan for the production of both h and l individuals, in the light of objectives described in section D.1. Note, however, that different value weights may now be used for satisfied social demand under h and l attainment. Also, the value weights applied to (differential) resource costs, fiscal costs, and foreign exchange costs may have to be modified under successive versions of the general plan.

The results of proceeding along the suggested lines cannot be predicted. In any case, no model of this nature is ever found totally adequate when steps have been taken toward implementation. Some of the original constraints are found to reduce the feasibility domain excessively, while additional constraints may have to be introduced to restrain or sustain certain values not originally expected to go beyond their "acceptable" range (acceptable in the light of some implicit objectives or physical limits). It cannot be predicted whether the comprehensive optimization program would select the highest feasible growth of h attainment and

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1. Note that, since the percentages h_i', h_i and l_i each add up to one over all attainment classes in the sector, the sum of requirements over all attainment classes $(\sum_i n_i)$ always adds up to the sector's total labor requirement $(H + L)$.

associated $\overline{\text{GNP}}$ growth, since high fiscal costs, foreign exchange costs and
(possibly) rates of unemployment and underemployment might make such an
option prohibitive. On the other hand, the (negative) value weight
attached to fiscal costs should drop with higher GNP's; if this effect is
substantial, the economy might be able to absorb an increased quantity of
educated labor force in the provision of more "social demand" education.
Unemployment at lower attainment levels will eventually be absorbed when
economic growth has brought the size of the economy to the point where
labor becomes a scarce factor.

capital-labor ratio; h_i under generalized $\underline{h}$ attainment and an advanced country capital structure; and l_i under generalized $\underline{l}$ attainment and a LDC capital structure. The term s is the fraction $\frac{R - R^=}{R^+ - R^=}$, where R is the capital-labor ratio given for the sector by the general plan, $R^=$ is the ratio observed in the reference LDC, and R^+ is the ratio observed in the reference advanced country.

What is assumed in expression (1) is that the distribution of available $\underline{h}$ and $\underline{l}$ labor among standard attainment classes in each sector is not strictly determined: The amounts of $\underline{h}$ and $\underline{l}$ labor made available to the sector under the general plan only determine total labor requirements in each standard attainment class, thus permitting multiple transfers among classes as long as the totals in each class are correct.

The labor technologies represented by (1) include those derived earlier under homogeneous $\underline{h}$ or $\underline{l}$ attainment: The values of H, L and s for which the latter appear as "pure" form are those entering the general planning model's production function at its anchor points $[\overline{H}=0, s=0; L=0, s=1; L=0, s=\underline{0}]$. Expression (1) adjusts labor technologies to values of H, L and s generated by the general planning model between (or beyond) these anchors, making total labor requirements in each standard attainment class a weighted function of labor coefficients at the anchor points. The weights of h_i' and l_i ($\underline{h}$ and $\underline{l}$ labor percentages under LDC capital-labor ratios) are the respective amounts of $\underline{h}$ and $\underline{l}$ labor assigned to the sector; the last term, proportional to s and to the difference $(h_i - h_i')$ of $\underline{h}$ labor percentages under AC and LDC capital-labor ratios, incorporates the effect

III. RECOMMENDATIONS

Although the set of recommendations proposed in this chapter is not entirely derivable from the analysis developed so far, the discussion carried out in the first two chapters suggests their outline and provides appropriate references. The recommendations are grouped under two headings. The first group is concerned with the content of educational planning activities, i.e. with the priorities which different levels of planning ought to receive and with the new orientations required for making planning both relevant and effective. The second group deals with AID involvement in educational planning, but mostly from the standpoint of AID's own decision making concerning assistance programs in the education-training area. In this light, the decision to assist countries in developing educational plans or planning organizations is an equal competitor of decisions to assist in teacher training, school construction, or any other activity. Nothing much will be said concerning the practice of educational planning assistance, except for the implication that recommendations under the first heading should be incorporated in whatever effort AID undertakes.

A. Priorities and Orientations in Educational Planning

Recommendations under this heading flow most directly from the analysis carried out in the first two chapters.

(1) First priority should be given to "production planning" of education at all levels

In view of the incapacity of many governments to resist popular pressures toward quantitative expansion of their education system, the chances for successful implementation of a systematic national resource allocation plan are generally small, and a greater pay-off can be expected from efforts directed at the efficient use of resources made available to each level and type of education, under effective minimum constraints concerning enrollments.

One part of this effort will take the form of "technical planning" concerned with the determination of optimum management rules for actual "production planners": i.e. rules leading to the maximization of some weighted achievement of prospective enrollees under given budget, enrollment and market constraints. The activities covered include the creation, expansion, location and consolidation of institutions, the generation of curriculum guide-lines, the setting of teacher salary schedules, the deployment of the expected teaching force, teacher training and school inspection, the production and distribution of equipment, textbooks and other materials, the management of admissions and examina-

tions, etc. While optimizing programs are inappropriate to determine the full detail of annual "production" decisions, models can be developed in terms of broad categories of students, institutions and geographic areas, providing optimum decision rules which central administrators can use in working out actual production plans. It is obvious that, even at this level, the development of serious models requires information on education "production functions" and on teacher "labor markets" of a quality not yet available. Nevertheless, attempts should be made to carry on, incorporating whatever prejudices may be translated into quantitative terms and the few available bits of solid evidence concerning, for instance, economies of scale in education production.

The second area of recommended effort is toward creating appropriate administrative structures and attitudes for the development and implementation of education production plans. Attitudes cannot be changed or created quickly, and the means available to dispensors of foreign assistance are fairly limited, e.g. support of new curricula in administration and management, organization of internships, etc. While the reform of administrative structures is more promising, care should be taken that proposed alternatives are compatible with existing local attitudes--which is not always true of U.S. imports. Both in terms of experience with centralized systems and of familiarity with some attitudes common in the underdeveloped world, a good case can be made that Europeans--even East-Europeans--should constitute more of the technical assistance input in this area.

(2) <u>Second Priority should be given to financial planning</u>

Financial planning plays a critical role in the proper allocation of resources to and within education.

(a) It is evident from earlier analysis that the major barrier to the allocation of more resources to education is public unwillingness to sacrifice income rather than actual resource scarcity (potential teachers are unemployed or underemployed). This, at least, holds true of general education at the elementary and secondary levels and after early "emergence" bottlenecks have been overcome. Assuming that <u>some</u> limit can be placed on enrollment expansion, substantial progress will, therefore, be achieved if means can be found of funneling additional funds to the educational enterprise.

It is doubtful that imaginative solutions are available within the traditional limits of public finance. Although the total of public funds raised from the various collectivities can be increased by tying certain taxes (in money or in kind) to identifiable educational activities, the public financing of education must still be viewed as part of the political decision process that allocates a public resource "pot" among alternative services. The decision begins at the constitutional level (the distribution of responsibilities and taxing powers among different levels of government has a definite impact on the allocation of public resources to various kinds of education), but much of it derives from the year-to year contest between competing demands on limited public budgets.

In view of the various constraints affecting the expansion of fiscal
yields in less developed countries, maximum use should be made of less
painful methods of financial transfer, such as payment for services ren-
dered. The charging of tuitions, especially in the public sector, is
ideologically repulsive to many governments. It is nevertheless true
that large additions can be made to educational budgets in relatively
painless fashion by charging tuitions and establishing a discriminatory
system of grants or fee remissions together with specially designed stu-
dent loans. Further substantial resources can be attracted in the form
of donations (money, facilities and personnel time) by subsidizing pri-
vate education institutions at appropriate levels. It is unfortunate
that our own advisers' prejudices in this area should too often coincide
with--and reinforce--those of national leaders in aided countries.

(b) While problems associated with the distribution of educa-
tion among identifiable groups belong to both "resource" and "production"
planning, there is little doubt that financial considerations are of pri-
mary importance. The equalitarian principle that supports free public
education does not always carry into the provision of equal educational
resources to all segments of the population. It is, furthermore, apparent
that the failure to supply adequate elementary education in say, rural
areas, is largely traceable to biases of the financial-fiscal apparatus.
At another level, family income remains a main determinant (or, at least,
a main correlate) of access to secondary or higher education. This is
true even where such education is available free (or nearly free) of charge

in public institutions, especially when the latter provide services and associations that are inferior to those in the private sector. Under a generalized system of tuitions, it becomes of primary importance that a well designed system of grants, fee remissions, and loans be established for students of the public sector. To the extent that private institutions receive a basic subsidy, their fee structure (as opposed to level) should be regulated so that remission of given percentages of total tuition is accorded specified percentages of the student body.

(3)   Third priority should be given to resource planning

The shift in emphasis from the achievement of quantitative manpower objectives to quality upgrading and economic integration of the educated should be reflected in new specifications of manpower and education planning models. The lines along which models should be redesigned can be described as follows:

Objective function. In addition to terms measuring projected consumption (public and private) and terminal stocks, new variables must enter the objective function with substantial positive or negative weights:

<div style="text-align:center">

Unemployment

Underemployment

Satisfaction of Social Demand for Education

Reinforcement of rural elementary education

Fiscal transfer cost of education

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(The latter element refers in part to the subjective sacrifice incurred by individuals when spending additional portions of their income

collectively, and in part to the net subjective cost of the accompanying income redistribution).

Structure. Existing model structures must be modified on at least three accounts:

(a) Determination of unemployment and underemployment

These are generated by social demands that may exceed manpower requirements and the need for a "surplus" of graduates from all education processes to cover leakages into "non-standard" occupations and education tracks. As a result, there are more job seekers with appropriate qualifications than jobs requiring them, at each level of educational attainment. Those in excess become "underemployed" in "lower level" jobs where they displace employment seekers of the appropriate educational attainment and add to the excess labor force at those levels. At the bottom of the ladder, the excess labor force drops into unemployment.

b) Specification of alternative technologies in non-education sectors, allowing use of several (at least two) qualities of personnel in each occupational category and some degree of capital-labor substitution.

c) Specification of alternative (at least two) processes in each educational cycle, producing different qualities of graduates (the major input difference being the quality of students and teachers).

(4) A substantial proportion of AID assistance should be spent on research projects.

Whether supported and managed by AID or by appropriate international agencies (with AID participation), there is no doubt that a major

research effort is required if educational planning in LDC's is to become more than an academic exercise. Individual countries will naturally be reluctant to use their own resources for the purpose of carrying out research unless experimental results emerge as a by-product of directly beneficial activities. The reason is, partly, that scarce resources are not lightly gambled, partly that knowledge is a collective good available free of charge to those who know how to wait. In any case, international sponsoring is a condition for systematic research programs to be carried out.

As indicated in Part I, the research required is of the "engineering" type and the most promising methodology, where feasible, is the controlled field experiment. The objective is only partly to provide planners with the empirical information they need to predict the outcome of alternative actions. An important role of research carried out within LDC's and, as much as possible, through LDC personnel and institutions, is to educate those countries in certain realities and possibilities which they are reluctant to face. Without pretending to be comprehensive, the following areas may be designated as deserving some priority for research:

-Techniques of elementary education in the rural environment, especially the one or two teacher school.

-Size and organization of secondary schools and higher education institutions (mostly as an educative device to convince LDC's that some of the technologies and modes of organization they have adopted are, indeed, incompatible with the generation of quality outputs).

-Vocational-occupational training in all its aspects.

-Inventory of material input vectors for each level and type of education.

-Supply functions of teaching personnel.

-Estimates of loss of "developed talent" across occupations due to failures of the educational selection process, and translation into measures of "GNP foregone". (as an educative device)

-Estimates of enrollment demand from different groups in different kinds of insitutions for alternative schedules of tuitions, grants and loan offers. This information can provide measures of potential revenue from the charging of tuitions and, at a later stage, become an element of financial planning.

B. <u>Planning of AID Assistance Programs in Education</u>

Under ideal conditions, AID decisions to allocate available--or
expected--budgets among alternative assistance programs would be deter-
mined systematically by reference to fully specified decision models at
one or several levels of the Agency. It is apparent, however, that tech-
nical and psychological readiness for this type of enterprise are less
than adequate at the present time. Furthermore, it is neither desirable
nor possible to by-pass the process of direct interaction between Missions
and governments leading to eventual selection. The need, in such a con-
text, is for strategies concerning the manner and degree of participation
by aided governments (or other units) in determining assistance programs
and in formulating related policies.

The aid philosophy advocated in this section is at variance with
policies favored by AID during recent Administrations, i.e. the utiliza-
tion of U.S. assistance as a lever to influence economic and social
policies in aided countries. The impression one gathers--and its raising
to the level of a conclusion would require a documented study--is that
we have grossly overestimated the impact of policy conditions attached
to our assistance programs. The mass of foreign exchange contributed
may have been sufficient, in some cases, to bend the will (or lack thereof)
of governments, but the latter have learned, by now, that we rarely make
good on our threats and are quite willing to play whatever face-saving
game they are able to engineer. In the end, we accumulate ill will and
resentment toward ourselves with little to show in the way of major policy

re-directions. We must, of course, continue to provide extensive technical help in planning and policy formulation when requested to do so. But we should show preference for helping in establishing planning and administrative structures, training individuals, developing and supporting appropriate research, and—at the limit—influencing attitudes, as against unfolding pre-fabricated policy formulations or—still worse—extracting such formulations from unwilling governments through heavy-handed pressures.

The present recommendations extend similar principles to the choice of technical assistance projects and programs. It is unwise for any general re-direction of education in the aided country to be identified as an "American Reform". Yet, the label is bound to be applied, and the more so as the development is unsuccessful or, simply, painful, if our Mission has promoted it against the better judgement or ingrained prejudice of the local Establishment.

This does not mean that foreign assistance should be administered without regard for the use to which it is put, or that we should abandon our efforts toward influencing policy. However, the latter should take the form of active "selling" of our views, including appropriate local research and demonstration but excluding all forms of blackmail. To maintain control and, at the same time, guard against tragic misfirings, a central principle should be that aided countries present their own list of desired assistance projects, and that AID select a feasible package on the basis of two successive criteria:

(a) The funded projects should be efficient within the country's own development plans—which implies that some local planning

is a pre-condition for assistance.

(b) The funded projects are those promising the highest return
in the light of AID's own analysis, based on a realistic estimate of the
country's future development as constrained (if at all) by its own plann-
ing and on our own objectives concerning the country's welfare. Clearly,
such elements as the state of international assistance from other sources
and the satisfaction of legitimate US political or economic objectives
will further affect the eventual selection.

A condition for the application of this strategy is that our
Missions undertake a "parallel" planning effort constrained by predicted
policies of the assisted country but leaving free options concerning the
size and shape of material assistance from the international community,
as well as the efficiency of certain sectors or activities opened to
technical assistance. Very few of the policy models developed by Program
Divisions in our Missions correspond to this description: too often,
they generate optimum policies of the assisted country--which its govern-
ment is unlikely to follow--by reference to projected profiles of US and
other international assistance. Moreover, Mission models rarely extend
to education planning, except in the form of standard manpower require-
ment projections of minimum relevance to current decision needs. Little
rationality can be expected in our assistance to education until our
Missions dispose of a parallel education planning machinery which, in full
recognition of policies pursued by the assisted country, pinpoint the ex-
pected benefits of alternative assistance programs and program packages.

While the Mission's planning problem has much in common with that assigned to "technical" planners within the country's decision structure, it incorporates several additional dimensions. The raising of achievements at each level-type of education is no longer fully constrained by available domestic budgets and local market conditions: material and human resources can be contributed through foreign assistance, and the problem is precisely to determine their level. In the second place, Agency planners are not constrained by the _objectives_ of assisted countries--only by their policies: They need not contribute resources to make certain objectives attainable--or to raise their level of fulfillment in the light of high domestic priorities--if this conflicts with their own evaluation. Conversely, they must be ready to propose projects considered of low priority by the assisted country but found highly beneficial from the Agency's standpoint, as long as such projects remain consistent with the country's stated policies and do not commit a significant amount of its own resources.

The Agency's planning models should remain flexible in areas for which no solid empirical base of knowledge is available, reserving their strong specifications for those in which outcomes can be predicted with adequate confidence. Within broad limits, for instance, statements concerning the desirable size of enrollments at any level, or of enrollments at one level relative to enrollments at another, rest on no more than prejudice sanctioned by habit and print. It is therefore disturbing to find so many Agency documents making expansion of enrollments at one level or another the cornerstone of their analysis in support of assistance programs.

Similarly, technical assistance should emphasize the lines along which the least doubt exists concerning the effectiveness of recommended practices, e.g. science teaching, textbook production and distribution, technical and professional training, basic teacher training. It should avoid suggesting the generalization of new methods or structures when their effectiveness in the LDC context is open to serious doubt--and especially when that effectiveness in the U.S. is itself a matter of faith rather than evidence; e.g. new teaching styles, utilization of programmed instruction and television, new patterns of grade or school organization, vocationalization of instruction, shift to comprehensive secondary schools, etc.

A few other principles should be kept in mind, some concerning appropriate forms of assistance and others the handling of feasibility and planning studies.

(a) As already suggested, there should be minimum involvement of American personnel in generalized reforms, especially when these affect established structures. In contrast with strictly technical areas, where American expertise can be used on a broad front to diffuse change rapidly, American involvement in changes of a structural nature (new patterns of organization and personnel use) should be limited to the development of models, clearly labeled as experimental, which the country may, or may not emulate, together with research and training activities and provision of logistical support.

(b) Partly because parallel planning by missions has not been

the object of a sustained and systematic effort, ad-hoc planning studies
have tended to be produced as a by-product or feasibility studies under-
taken toward specific projects. In some cases, the planning study has
taken the aspect of an ex-post facto rationalization of choices already
made. In others, the planning exercise has been undertaken without man-
date by the feasibility study contractor as a means of justifying entirely
new sets of proposals going far beyond--if not counter to--the original
project. Given the superficiality of the analysis, such excess of zeal
has had no pay off in the way of acceptable plans for the missions. Worse,
however, unsollicited proposals have been known to mature into substantial
contracts to the benefit of their originators. It is apparent that con-
flicts of interest will emerge as long as planning and feasibility studies
are not clearly separated.

(c) There appears to have been an excessive tendency on our
part to downgrade planning efforts previously made--sometimes with the
aid of our own experts--by assisted countries, and to ignore their assist-
ance requests in favor of broader or unrelated proposals developed from
our own new package of random expert studies. As already suggested, vested
interests in further contract work may, at times, have affected the recom-
mendation of substitute proposals. The main point, however, is that the
quality and comprehensiveness of the analysis carried out by our teams
have often been inferior to those evident in previous planning efforts of
the assisted country. As long as our Missions lack the capacity to support
a valid "parallel" planning structure of the type outlined in this section,

they would do well to evaluate carefully the analysis presented in support of foreign requests, and to put primary reliance on it if the particular prejudices it incorporates do not alter its basic soundness. Alternate teams with alternate prejudices should only be brought in when a disinterested evaluation of evidence in support of the request suggests serious shortcomings in the areas of methodology, factual information or apparent objectives.