Systems Application to Educational Planning*

Ayalew Kanno

Introduction:

Educational planning, as any other planning, should be approached in a systematic way. A look at some educational plans from around the world, particularly from the developing countries, reveals that a great many of them follow piecemeal approach to planning. This is to say that all of the components necessary for a complete plan are not taken care of, and even where they are considered they do not follow a logical and systematic order.

Systems approach to planning generally follows these guidelines. First, objective is defined, that is, what is needed to be achieved is identified. Second, appropriate methods are selected to insure the best possible way of achieving the specified objective. Alternative ways and means are carefully considered. Thirdly, the most appropriate materials, facilities and equipment necessary to implement the plan as well as other social inputs are identified. In conncetion with this, appropriate roles that individuals and institutions will play in the execution of the plan are defined and assigned. Then the plan is implemented. The final and probably the most important step is to test the implementation, evaluate the outcomes in terms of the original objectives, refine and revise the goals if necessary.

Thus systems application to eductional planning requires the breaking down of elements of problems into relevant components and sub-components until meaningful and workable units are isolated. Even objectives should be in terms of desired outcomes, and in terms of the skills needed. Behavior which is considered evidence of the skill should be spelled out so that it can be easily assessed.

The usual sequence in systems approach is given as "(i) problem specification - which leads to qualitative definition of the relevant system, (ii) systems analysis - which attempts to provide a quantitative specification of the system, and (iii) systems synthesis which attempts to give a solution to the original problem." (22)

Harbison offers a clear illustration of the systems analysis concept. "It should be possible to look at the various constituent elements of human resour cedevelopment as a system which is somewhat analogous to a system for the generation and distribution of electric power. In using this frame of reference, one can identify skill-generating centers, such as, for example, schools, universities, training institutes and employment organizations, which develop people on the job. The link-

ages between such centers are analogous to transmission lines. The manpower problems, such as skill shortages and labour surpluses, encountered by developing countries may be thought of as attributable to power failures in particular generating centers, ineffective linkages between these centers, or faulty design resulting in the failure of the total system to cary the loads expected of it. A system of human-skill generation, like a system of electric-power generation, should be designed to carry varrying loads; it must have built-in flexibility to meet such loads; it must be adequate in size; and above all its components must be properly balanced. The systems analysis approach makes it easier to identify in operational terms major problem areas, and it compels the analyst to examine the critical inter-relationships between various manpower, education and economic-development programs. It provides a logical starting point for building a strategy of human resource development." (20)

Mainly, a systems approach to decision making has three main points. The system allows itself to be continuously changed and corrected in light of experience. The decision following a system must be to achieve a specified and measurable outcome. As Razik said, with the systems application to educational planning, it is possible to see the end in view, that is to predict the outcome with relative accuracy. (7)

Razik himself applied the systems model to educational planning in the three countries of the Sudan, Ceylon, and Kuwait and demonstrated the extent to which it is possible to generalize and adapt a system model to varying situations. "In recent years the use of the systems approach in education has gradually become widespread. It is now apparent that highly creative and successful solutions to the planning problems of educational systems can be developed through such an approach. Because systems approach employs highly adaptive metholdology it can be utilized to solve a wide variety of educational problems."(7)

The central theme of the systems approach is that there is unity of purpose and complementarity of action. Any part of the system must support and complement the other parts and all the parts must function together to achieve one objective. It is this kind of central reasoning that makes the systems approach attractive because as Ruscoe said, "Planning, above all, is an attempt to apply reason to the process of educational change and development. Planning introduces rationality to the extent that it allows a nation to achieve optimal use of human, material and financial resources in meeting educational objectives and, at the same time, to achieve effective coordination between educational and other types of national development."(11)

Application of the systems approach to educational planning, therefore, requires a clear understanding of the functions of the different stages in the system.

National System

The basic premise on which the systems approach to educational planning is founded is the argument that education should be related to a broad strategy of human-resource development rather than to a limited concept of "education"

planning. Education should be related to national development plans, national political ideologies and the programs of the various agencies and organizations in the country. (See diagram)

First, the contribution that the education sector makes to the national system needs to be known. This is, of course, defined in national goals and objectives. It is there understood that education is only one of the sectors among which the national resources are divided, and therefore, the education sector can only be a subsystem of the national endeavor.

Particularly education cannot be divorced from a country's political philosophy. "Since education, as an institution, is an integral part of the society in which it exists, it undoutedly 'internalizes' or reflects, as well as influences (consciously and unconsciously, willingly or unwillingly) the political system that dominates that society. Thus the educational philosophy is a literall or intelligent interpretation of the political philosophy, the educational policy an expression of the interests of the ruling class, the nature of educational administrator reflects the nature of the administration of the state, and the educational outputs cope with, rather than are dysfunctional to, the political system."(26)

Thus, the contribution of other sectors to the training of skilled manpower should be kept in mind. In Ethiopia, for example, the Ministry of Agriculture has two agricultural institutes at Jimma and Ambo "to train young people for work as technicians in different fields of agriculture; to prepare young men as future farmers; to train young people to become teachers in Government schools where agricultural subjects are offered; and to train farm managers and technicians for commercial farms and for commercial and national agricultural organizations."(21)
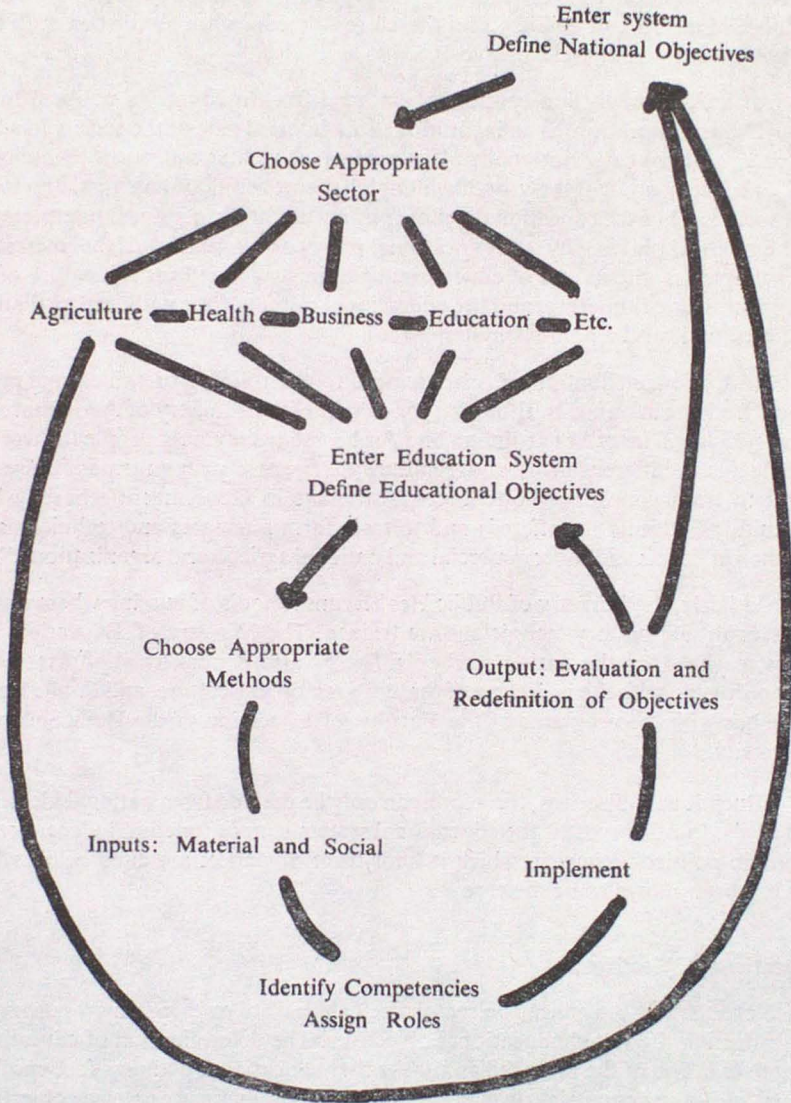
Similarly, the Ministry of Public Health runs schools of nursing where nurses, dressers and laboratory technicians are trained. The Ministry of Education also trains teachers for the nation's schools. These various ministerial efforts should be coordinated with the programs of the colleges of Agriculture, and Public Health as well as with the programs of the Faculty of Education of the Haile Sellassie I University.

Educational objectives, therefore, can only be derived from national ideologies and goals. In other words, the educational system cannot function independent of the socio-political system in which it finds itself. Instances are cited below where this has been shown to be the case.

Educational Objectives:

Nevertheless, the education sector itself should follow a systems approach in implementing the stated educational objectives. The determination of educational objectives is one of the most difficult tasks that educational planners face specially in the developing countries. It may be said that where there are no clear objectives, there can be no systematic planning. There are some developing countries where

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Diagram

Enter system
Define National Objectives

Choose Appropriate
Sector

Agriculture   Health   Business   Education   Etc.

Enter Education System
Define Educational Objectives

Choose Appropriate
Methods

Output: Evaluation and
Redefinition of Objectives

Inputs: Material and Social

Implement

Identify Competencies
Assign Roles

national objectives have not yet been formulated, and even where formulated, some of these goals sound too philosophical and or theoretical.

But it is known that attempts to derive educational objectives from philosophical theory would fail to provide anything genuinely viable and relevant as a body of principles unless that theory is brought into some meaningful relationship with the facts of personal and social experience; with the needs and interests and aspirations of individuals; with the failures, successes and goals of society; with the established personal and social values and the criticisms of those values. (18)

Mager identified three qualities of meaningful objectives. "First, identify the terminal behavior by name; i.e. specify the kind of behavior which will be accepted as evidence that the learner has achieved the objective. Second, try to further define the desired behavior by describing the important conditions under which the behavior will be expected to occur. Third, specify the criteria of acceptable performance of describing how well the learner must perform to be considered acceptable."(23)

There is certainly a difference between objectives that are measurable and objectives that are value-oriented and hence cannot be measured. Unless objectives are stated in measurable terms, assessment would be very difficult. The Addis Ababa plan of 1961 called fof the establishment of adequate measures for the preparation and implementation of national educational plans, for the collection of necessary statistical data and for their periodical evaluation. (14) This would not be possible unless objectives were stated in measurable terms.

Educational planning in *developing* countries of necessity should be based on the role of education in national *development* and on the nature of education. Attractive strategies cannot be afforded if they do not reflect national needs and if they are not derived from a realistic assessment of what education is and what it can do. (15) Edgar Faure also noted that two questions arose when one turned to analyze the ultimate aims of an educational system: the first is, what is their real substance, beyond the language in which they were formulated; and the second, who defined them? (2)

This is also a very significant point because plans in the developing countries have been seen to fail as the people who are affected by the plans had not been involved in the initial stages of definition and formulation. In some cases, the stated objectives are found to be too general and need further redefinition. The following six objectives are taken from Ethiopia's Third Five-Year Plan for purposes of illustration.

1. To provide educational opportunity for an increasing number of people, particularly for the rural population.

2. To provide an educational system with a more modern scientific outlook, yet in harmony with Ethiopia's cultural traditions.

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3. To acquaint youths with their country and the opportunities for participation in its development, and to develop positive attitudes for manual work and practical skills.

4. To expand the use of (national language) as a medium of national communication.

5. To provide a system with maximum upward mobility, to the end that an ever larger proportion of youth are offered opportunities for higher education and high level training.

6. To emphasize quality education.

Objectives stated in this form can at best be general guidelines. They must be further defined and stated in specific and measureable terms. Problems that deal with distribution of educational opportunities and the proportion of youth in the different levels of education can most accurately be based on reliable population figures. And it is known that no efficient planning is possible without constant reference to the present and future demographic profile of the country. (13)

A clearer and more measurable objective is that suggested by Ethiopia's Education Sector Review. The general objective in the review according to which strategies were calculated was to achieve universal primary education in Ethiopia by the year 2000. Three different strategies were formulated in order to achieve this objective, and the participants of the review conference agreed on a combination of two of the strategies. This is one of the requirements of the systems approach that is to consider different alternatives and accept the most appropriate method. (19)

Methods of Achieving Objective:

The systems approach to educational planning does not rely on any one particular method to achieve the stated educational objective. Rather educational institutions are looked upon as skill-generating centers, and it is recognized that there is a whole series of problems that are related to these centers. Some of the problems that should be taken into consideration when following a systems approach to educational planning are: "the consequences of population increases and the measures for controlling them; underemployment and unemployment in both the traditional and modern sectors; skill shortages and the processes of developing high level manpower to overcome them; organizational weakness and the need to find prime movers of innovations for institutional development; and provision of both financial and non-financial incentives in order to direct critically needed manpower into productive channels."(20)

These problems cannot be explained by any one particular method of analysis. Some of them may be quantitatively analyzed, but indeed some of them are qualitative in nature. Concepts like innovation, and organizational leadership seem to be triggered by intuitive judgement and creativity. The systems approach thus requires simultaneous analysis of all of these problems.

Harbison used the systems approach to examine human resource development in Nigeria and came up with two major categories of problems. (20) The first category of problem related to skill and knowledge generation. He suggested that this problem could be solved by making some changes in the design and performance of institutions providing various kinds of education and training, as well as by providing effective bridges between them and the country's employing institutions.

The second set of problems related to unemployment and underemployment. Harbison maintained that this problem was more complex and could not be eliminated by tinkering with educational institutions and training programs. It requires a major change in national development objectives.

Choice of appropriate method also includes decisions regarding which age group should go to school, for how long, and how much money can be spent on them and so on. These are basic policy decisions.

The Ethiopian Education Sector Review conference used the following method in recommending a strategy by which the stated objectives could be achieved. First the desired educational systems were specified. The recommended strategy would provide four years of minimum formation education, to be made available to all children as rapidly as permitted by financial constraints; two years of basic formation for youths who have been unable to attend the minimum formation program; and an extension system of non-formal educational programs for youths and adults, which would be closely related to the formal system.(19)

This method or strategy was recommended because of its attrative features and potential for rapidly achieving mass education.

Inputs

Educational planning must go far beyond the construction of purely quantitative forecasts, projections, or targets for formal education. Educational planning should be related to a broad strategy of human-resource development, i.e. national development - a term which encompasses economic, cultural, social and political development (20)

The educational planner would be very well advised to note that education is an integral part of the processes of social, economic and political development. Educational planning must take into consideration newer social and economic strategies. A case in point is the new *Awaraja* self administration introduced in Ethiopia. Educational planning for these areas must of necessity be different from plans for areas where self administration is not introduced. The complementary link between formal and out-of-school education must also be reflected in educational planning.

Social inputs may be described as demands steming from social and political pressures for various kinds of education as well as from the willingness of people

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to make sacrifices to acquire it. "Thus, for example, the demand for university education may be very high because of the status, prestige, and pay enjoyed by graduates; but in many countries this results in the production of graduates who cannot be effectively absorbed in the economy." (20) For example, it has been estimated that the number of unemployed educated persons in 1975-76 in India will be about equal the total stock of educated persons in 1960-61. (25) Thus, a systems approach to educational planning can help balance distortions resulting from such social demands.

In addition, if the system is to function properly, material, facilities and equipment needed to achieve the stated objective must be specified. For example, among the specification found in the planning of primary education in Northern Nigeria are the following:

a) estimates of the total population of the 6 to 7 age group, the corresponding total enrollments in primary schools and the number of school leavers for each year,

b) projected enrollments year by year,

c) total number of classrooms needed and number of new classrooms required each year,

d) cost of classrooms,

e) teacher requirements year by year,

f) output of the various grades of teachers necessary to meet these requirements,

g) input into teacher training colleges necessary to produce this output,

h) and requirements of teacher training in terms of new buildings and additional staff.

"All these calculations were made on the basis of various assumptions with regard to population, westage of pupils, westage of teachers, teacher qualifications, staffing ratios, building costs, grants to school proprietors, school fees, teacher's salaries, level of prices, etc." (10)

Other demographic data required by educational planners are, "first, distribution of population by age and sex to measure the relative size of school-age population; second, distribution of population by economic activity to estimate manpower requirements; and third, geographic distribution of population to determine types, sizes and locations of schools needed." (13) Specifications are also required for additional and new curriculum materials, textbooks and teaching aids needed to achieve the stated objectives.

During the Ethiopian Education Sector Review, after agreement was reached on the desired system of education, enrollment estimates were then derived. First,

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total funds to be made available for expenditure on education in each year were projected, and from these total allocations were first deducted for each year. Three categories of allocations were made: expenditures for higher education, mass media, and subsidies to non-government schools; costs of administration, including charges for Ministry of Education and provincial and district education offices; and nonrecurrent costs, including capital funds for school construction and replacement, and one-time expenses for curriculum re-design and teacher re-training.

Similarly, the costs of first and second level education as well as cost of teacher training were calculated. Per-student costs for each year were also calculated, and and the enrollment levels to be attained in first and second level schools were projected by dividing calculated per student costs into the total allocation. Estimates of the numbers to be accommodated in non-formal educational programs were determined similarly.

Roles and Competencies:

Once the objectives are known, methods of achieving the objectives have been selected, and material, facilities and equipment and social inputs are specified, the next step in the system is to identify competencies required to implement the plan. Defining and assigning appropriate roles is one of the elements often missing from educational planning particularly in the developing countries. Without definition of roles, without identification of who is to do what, implementation of educational plans would be very difficult. Clear division of responsibility among institutions is also necessary. The task must be divided among those responsible, and therefore, those responsible must be identified. It is often felt that this could be taken care of administratively. However, unless some decisions are made to this effect in the planning stage implementation will be delayed and made more complex.

It has been indicated earlier that various Ethiopian Government Ministries either sponsor or are directly concerned with education. The Ethiopian education sector review conference also pointed out the need for a higher degree of education coordination at the Ministerial level. Formation of an Inter-Ministerial Coordinating Committee on which would be represented all Ministries with educational concerns and interests was proposed. (19) Such a committee might help solve the problem of institutional and organizational inadequacies by assigning roles and dividing responsibilities among the various institutions.

In cases where educational plans are designed on a large scale at national levels, division of labor may be done at different levels. As Wheeler pointed out, it was obviously the case that, in a country the size of India or Brazil, a national educational plan could not go into detail down to the level of individual local authorities, or individual schools. The national plan had to be a blue print for provincial action which in turn will be more detailed in relation to these specific projects. (12)

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Implementation:

It must not be forgotten that plans are implemented at the local level where the job is done. It should not also escape the planner's attention that the development of plans is a technical process whereas the implementation of the plan is generally an administrative responsibility. But there is no clear line of authority and responsibility so as to create a boundary between the two. However, the planner has to include in the plan certain guidelines which the administrators need to follow. In some cases the planner himself also may be involved again in the implementation stage, because of shortage of manpower in the developing countries.

This problem has been encountered in educational planning in Tanzania where it was emphasized that the administrative procedures needed for plan implementati- must be as carefully planned as the availability of funds or the supply of teachers. "This leads to what must be virtually an axiom of planning in a situation where there is acute shortage of high-level administrative manpower; it is that future plans must be drawn in such a way as to maximize the chance of their implementation by the administrative staff likely to become available." (9)

Also the point sometimes forgotten when considering the division of labor and responsibilities is the role to be assigned to non-government schools. Non-government schools such as Church schools, mission and private schools should also be included in the plans. This has been rather difficult in the developing countries because of the lack of information about the role which private or non-government educational institutions can and will play in future educational development.(11) Indeed, this lack of information has created difficulty for educational planners.

Almost in all cases of educational planning, some unforeseen difficulties hinder the smooth operation or implementation according to plan. A report from Uganda shows a clear illustration of this problem. The enrollment forecast for one of the classes of Uganda in 1965 was 6060, but two of the classes planned were not opened because buildings were not ready; also some of the enrollments planned for individual classes could not be fulfilled, usually for lack of physical facilities. During that year then, 5900 students were enrolled instead of the planned 6060.(8)

But sometimes the problems are beyond the control of the persons in charge of implementation. Another instance can be sighted from Uganda to illustrate this point. Up to 1962 entry, the grade V teacher training course had been a Makerere University College course. It was a diploma course which was often followed by students who were not likely to be successful in obtaining the normal degree. "But with the expansion with Makerere, this course was abandoned and replaced by a two-year post high school course. The latter, however, was not popular, because it had lost the Makerere prestige, and as there were numerous other opportunities for high school candidates, even those who had failed, the entries for the course fell considerably in 1963 and in 1964. This was a serious matter and, in the end, Makerere agreed to take up the course again."(8)

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It is also interesting to note that reorienting attitudes was one of the points recommended by the Education Sector Review Conference in Ethiopia. "Perhaps the greatest challenge in implementing the recommendations of the Sector Review- or any other far-reaching change in the nation's educational system- would be the need to reorient the attitudes of the people of the nation toward the purposes of education. ... the recommended system would provide a self-contained program at each level that would be terminal for most students. Its adoption would require recognition and acceptance of this by pupils, parents, teachers, educational administrators, and people from all facets of Ethiopian society." (19 vii-4)

There is thus a conviction among planners that the public must be involved in the preparation as well as the implementation of the plans. The Ethiopian Teachers' Association, at its 1973 annual convention, for instance, has expressed reservations that some of the recommendations of the Sector Review were finalized before the Association had a chance to express its view. In fact the members voted on a resolution expressing this opinion. Therefore, one of the most important steps in implementing a plan is to inform the public and obtain their understanding.

This is necessary because where there is a change at any one point in a system, necessary adjustments will have to be made in the rest of the system. But any adjustments needed and the consequences must be understood and supported by the people affected by the decision. For instance, where there is one division of responsibility of primary and secondary education, and another for higher education, attempts to reform one division cannot be successful without making concomitant changes in the other division. If the objective of a plan is universal primary education, this means that second and third level education will have to be controlled. This is easier said than done if there is no public acceptance of this proposal.

President Nyerere has also warned in his paper "Education for Self-Reliance" against possible community resistance to new ideas contained in educational plans. "It is easy to say that our primary and secondary schools must prepare young people for the realities and needs of Tanzania; to do it requires a radical change, not only in the educational system but also in many existing community attitudes." (3)

However, neither the educational planner nor the administrator can always afford to hasten to inform the public about the proposed plans. "Why this should be so is best understood by distinguishing between political impetus to initiate planning and political commitment to planning. The establishment of planning offices has normally required a prior political decision, at either the ministerial or the national level. The political impetus to begin planning has frequently not been accompanied by political guarantees that planning will hold some relatively clear and important position within the decision making structure. Thus, most educational planners find themselves from the outset in the uncomfortable position of having their legitimacy proclaimed on political grounds with little or no political guarantee that plans will be heeded or that educational reform and development, except in the most general terms, will be supported." (11) But this nevertheless

should not overshadow the significant fact that evaluation requires some feedback mechanism from the smallest administrative unit upwards. Therefore, it is recommended that the public should be informed whenever possible.

It is often said that the educational planner is neither a politician, responsible for broad educational objectives, nor an administrator, responsible for taking action to achieve those objectives. Views are expressed that the planner is a technician whose job it is to develop and describe alternative technical means by which objectives may be achieved. But it is also important to note that technical decisions are frequently deferred in order to make the correct political decision. In some instances, of course, decisions based on technicial and on political grounds correspond, but in other instances political decisions are not supported, and are perhaps contradicted, by technical evidence.(11)

That is why no educational plan should be accepted as the final judgement on the future of education in any one country. This problem seems to be more often recognized by planners than by administrators who are very eager to implement the plan and do not seem to have time to rethink over it. This is so because the so-called five-year plans in the developing countries are full of deadlines.

Outputs: Evaluation and Redefinition of Objectives:

To hurry up to meet deadlines is one thing, and to recognize the importance of testing and evaluating before irrecoverable damage is done is another. It is generally agreed that no matter how carefully a plan is prepared and how many factors and details are taken into consideration, the educational planner cannot assume that matters will work out in strict accordance with his plan; they almost certainly will not, and by the time the new schools are running, the system may look very different from the original plan. (8) The administrator or the person who is in charge to implement the plan needs to bear this in mind; that an educational plan must constantly be amended and sometimes even overhauled.

An assessment of Ethiopia's Third Five-Year Plan, for example, revealed that the picture that developed from a review of performance in the education sector during that period was one of complexity and rapid change. Goals set at the outset of the plan, as in adult literacy and vocational-technical education, needed to be reassessed. Understanding of the motivations and aspirations of the people, market forces, the economic and social climate, and other factors that affect objectives and their achievement had changed overtime. (6) Hence, the need to modify and redefine the original objectives in light of new information.

In a similar spirit, Sir James W. Cook, Vice Chancellor of the University of East Africa, in a message of welcome to a conference on teacher education emphasized the need "to take stock of the situation with a view to redefining objective and priorities."(4)

Haile Sellassie I University in Ethiopia also faced the necessity to redefine objectives. For example, it was reported that La Follette's plan called for the

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University to expand rapidly from its enrollment of 1626 in 1963-64. He expected an enrollment of regular full-time students of 5,500 by the year 1980. In fact, full-time enrollment reached 6,474 in 1973, that is ten years after the La Follette report, rather than in the expected seventeen years. "With respect to staffing, in 1963-64, the University had a total of 232 instructors, a ratio of one instructor for every six students. La Follette planned a reduction in this ratio to 1:15, he envisioned an instructional staff of approximately 335 for an enrollment of 5,500. In fact, the University has doubled the staff since 1963, and the ratio now stands at 1:9." (16)

Similarly, in a ten-year plan for the controlled expansion of Ethiopian education in 1955, it was proposed that by 1964, annual output of teacher education in Ethiopia would be 232 teachers. (17) In actual fact, Ethiopia was producing somewhere in the region of 2000 teachers annually by 1964. There is certainly a big difference between 232 and 2000.

Numerous examples can be cited to illustrate the necessity of redefining and revising objectives. But the important point is to realize that once the objectives have been redefined and revised a new cycle in the system is begun. The methods chosen earlier to achieve the old objective must be reassessed. Any new requirement for material, facilities and equipment must be specified. Similarly, any new manpower requirements for the implementation of the new plan, the divisin of labor and assignment of roles must be known. Then the plan may be implemented. And then again, there should be continuous evaluation, and if necessary, redefinition of objectives.

Concluding Remarks:

Finally, it must be clear to educational planners that good planning does not necessarily guarantee success. Ruscoe has suggested certain conditions necessary and sufficient for success in educational planning. These points may be used as a check-list by educational pllnners, and they are:

1. Political commitment to
   a) establish planning offices
   b) support planning activities,

2. Clear responsibilities and rights of planners,

3. Distinction between poliical, technical and administrative areas of planning,

4. Diffusion of power,

5. Clear educational policies and priorities,

6. Clear technical alternatives,

7. Reduction of politicization,

8. Assessment of public opinion to elicit support,

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9. Administrative support for change implied in planning, and

10. Coordination between government and private systems.

In conclusion, any redefinition of educational objectives at the end of the system's cycle must be made in accordance with national objectives, for no fundamental change can be made in educational objectives without corresponding changes in the national objectives.

As open system is proposed whereby continous evaluation allows for checking and revising both the objectives and the methods of achieving them. The ystems approach attempts to deveop not only quantitative but also qualitative analysis of whether or not the desired objectives have been achieved.

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