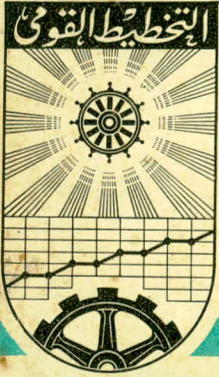


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NEEDS & PROBLEMS OF EDUCATION IN
AFRICA

PLANNING EDUCATION & TRAINING IN FOOD
AND AGRICULTURE

by

Dr. Alvaro Chaparro
August 1964.



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LECTURE 10.3: NEEDS AND PROBLEMS OF EDUCATION IN AFRICA

Part IV

Planning Education and Training in Food and Agriculture

By: Dr. Alvarez Chaparro

Rural Institutions and Services Division, FAO.

I. Introduction

1. Contemporary developing societies want to achieve higher levels of economic and social development in the shortest possible periods of time. This objective makes it imperative for them to get organized so that the necessary or available resources and means are put to work in the most efficient way possible, in the right order and at the right time. This implies careful planning. It is a process of rationalization of development, which is very complex, as economic and social factors are not so predictable as to make them easy to manage. The human factor is here of paramount importance, as it is both the object and the means of development.
2. The importance of the human factor makes education and training a prerequisite and an essential part of development. As a result, education is more and more conceived not as an end in itself - as it was the case before - but as an investment which produces the greatest dividends. Education therefore has not only the function of transmitting to the new generations the values and ideals of a society, but of equipping its members for the considerable changes implied by the process of accelerated development. As a result, education has to be equally planned, rationally and efficiently. This justifies the creation of institutions such as the International Institute for Educational Planning and the active programmes of the regional economic commissions and regional development institutes, for the study of problems related to the planning of education in relation to economic and social development.
3. The primary importance of food and agriculture in developing countries means that educational planning methods and techniques should give consideration to the particular problems, characteristics and needs of these sectors of the economy, as different from problems, characteristics and needs of other sectors such as industry or commerce.

II. Definition, Scope and Basic Principles

4. A recent Report of an Exploratory Study on the Inter-disciplinary Team Approach to Educational Planning, outline the steps of the process of planning and analyse some basic principles as conditions for its successful conduct.⁽¹⁾

Definition

5. In the Report mentioned above

"... educational planning is defined as the designing of a national education system directed to realistic educational goals, responsive to manpower needs, geared to available national resources for educational expenditures, and fully integrated with total national development planning."

(1) Developing Institutional Resources to Assist with Educational Planning in the Newly Emerging Countries - A Report of an Exploratory Study of the Interdisciplinary Team Approach to Educational Planning - Southern Illinois University Carbondale, Illinois, October 1963, pages: 10-21.

6. Agricultural education planning could be defined as the designing of a national system of education and training in food and agriculture, directed to realistic educational goals according to the desirable or expected development of agriculture and rural life, responsive to qualitative and quantitative manpower needs for that purpose, geared to available national resources for expenditures in agricultural education, built upon the general educational situation of the farm population and of the country as a whole, closely coordinated with research and extension and with the overall organization for agricultural development and fully integrated with plans for the development of agriculture and rural life.

Scope

7. So defined, agricultural education has a broad, inter-disciplinary scope, as development of agriculture requires the contributions of different scientific and technological fields. In a study of agricultural education, research and extension in Latin America, to be carried out in 1964-1965, the following fields are mentioned⁽²⁾

- i) The plant fields - food, pasture and forage crops, industrial crops, forests, plant protection.
- ii) The animal fields - animal production and health, fisheries.
- iii) The soils and water - soils and soil conservation, water resources and irrigation, agricultural engineering.
- iv) The processing of primary products - food technology and industries, fish industries, forest industries, other processing of farm products.
- v) The economics of agriculture including aspects of production, distribution and consumption - management of farms, forests and fisheries enterprises, marketing, credit and cooperatives, etc.
- vi) The structural, social and cultural aspects - agrarian structure, rural sociology.
- vii) Other aspects - agricultural aspects of human nutrition, home economics.

(2) FAO - Study of Agricultural Education, Research and Extension in Latin America, Rome, 1964, P. 3

8. The scope of agricultural education can be viewed not only from the point of view of fields of study but also from the points of view of functions of the trained personnel and levels of training. The latter should generally correspond to the former, although this should vary according to the stage of educational and technological development of the country. The following is a very general indication of relationship between levels of training and categories of personnel:

<u>Levels of training</u>	<u>Categories of Personnel</u>
(i) Colleges and faculties of universities and graduate schools	(i) Directive and high level categories: (managers, administrators, scientists, planners, professors, high level technicians and supervisors)
(ii) Intermediate level schools (post-primary, secondary and post-secondary)	(ii) Technical assistants in public and private services
(iii) Practical schools and farm training centres	(iii) Better farmers, farm managers and skilled labourers.

9. The inter-disciplinary aspects of agricultural education are important both in the planning and implementing stages. During the planning stage the participation of the agricultural educator, the agricultural economist, the rural sociologist and experts in different subject-matter areas of food and agriculture, are required. In fact, the Latin American Study mentioned above involves the participation of both the Technical Department and the Department of Economic and Social Affairs of FAO, and includes the cooperation of UNESCO and ILO.

Some basic principles

10. The Report mentioned above suggests a few basic assumptions, or principles, for successful educational planning:

- (i) It is the responsibility of nationals of the country concerned and cannot be done by outsiders, but international organizations can help technically and hopefully financially. This principle has been applied in the study of agricultural education, research and extension in Latin America, as follows: (a) A meeting of nine Latin American experts was held in Rome from 6 to 20 December 1963 for the purpose of discussing the project and advising FAO on how best to carry it out; (b) a plan of operation of the project has been outlined, to be negotiated with every one of the governments, in which the responsibilities and contributions of both the country and FAO are clearly specified; (c) conducting the study and writing the report, which should include at least the outline of a plan for the development of agricultural education, research and extension, will be the responsibility of a national committee organized for purposes of the study, and not the responsibility of FAO.

- (ii) A second principle is that educational planning is a continuous process, that is, it should not stop in just "producing a plan". It is considered that "planning is not a one-shot affair; it is a dynamic process that must be worked out continuously to keep goals and implementation plans in line with the reality of change" (3). In the proposed Latin American study, the plan of operations contemplates the continued existence of the national committee throughout the implementation and evaluation stages.
- (iii) A third principle is that planning of education must be closely related to national development planning. In the Latin American study, each country is considered separately, the national authorities for planning agricultural development are directly involved in the study and all institutions and services concerned with implementation of agricultural development plans, especially the ministry of agriculture, actively participates in the project. In fact, agricultural education cannot be viewed in isolation but should be highly sensible to actual quantitative and qualitative requirements for trained personnel. For this reason it is considered not only desirable but necessary to make ministries of agriculture responsible for agricultural education.
- (iv) A fourth principle is that "... provision of assistance to support and guide planning should have a definite element of continuity" The Report of Southern Illinois University already mentioned suggests that... "short-term help will meet certain needs, but the approach of having a 'planning team' spend a few weeks or even just a few months in a country to 'do the job' is inconsistent with the first two assumptions. Continuous help rather than one-shot help will be needed until local capability and local mechanisms are adequate to operate on their own(4). FAO is also following this principle. The Special Programme for Agricultural Education and Training in Africa, which operated during 1962-1963 and has been extended to 1964-1965 located in Africa permanent advisors whose task is to assist groups of countries in planning their agriculture education and training. Such advisors are expected to assist in every country the local authorities concerned with agricultural education and to utilize the experience of FAO's different departments and divisions.

(3) Report, op. cit., p. 19

(4) Report, op. cit., p. 20.

- (v) A fifth principle is that planning education should be sensible to the social and cultural framework of the country. This principle has particular meaning in relation to education and training in food and agriculture. Certain social values, traditions or segments of the social organization are closely associated with food and farming and it is known that rural people are more resistant to change than urban people. Agricultural education should be well aware of those values and traditions which should be changed, because they are barriers to progress, and of those things which the country want to conserve, or which have or may have implications in outlining realistic approaches to, and programmes of, agricultural education. The characteristics of agriculture and rural life in a given country set the framework within which agricultural education should be developed.
- (vi) Finally, agricultural education should be built upon the existing basis of general education. It can not progress faster than general education but at the same time it cannot wait until general education is fully developed and therefore it has to choose the methods and approaches which the existing levels of general education permit. Both should progress simultaneously. However, this does not mean that agricultural education should follow exactly the same institutional channels.

The Progress of Planning Agricultural Education and Training

11. The Report of the Inter-disciplinary Team Study suggests the following steps of the process of educational planning:(5)

- (i) Formulation of objectives
- (ii) Determination of feasible structures and programmes for attaining objectives
- (iii) Establishing priorities, determining procedures for implementing programmes and structures, and planning time-phasing
- (iv) Implementation
- (v) Evaluation, refinement and revision

12. The above enumeration of the components of the planning process should not be taken as rigid chronological developments. The objectives may be subject to change along a long period of time; the determination of manpower needs may have to be done before structures and programmes are established; evaluation, refinement and revision may have to be done throughout the entire process, and implementation may therefore include aspects of all other components of the process.

Two components of this process are of special interest to this paper and therefore will be treated in more detail.

They refer to the agricultural education institutions (section III) and to the estimation of manpower requirements for agricultural development (section IV)

(5) Report, op. cit., p. 11 to 18

III- The agricultural education institutions

13. In Section II above the scope of agricultural education was discussed in terms of (i) fields of training (ii) levels of training, (iii) Purposes, or functions, of different categories of trainees. Let us discuss now the kind or types of institutions which, according to experience, may be more efficient and effective.

Training the agricultural producers

14. A number of issues and problems which are often matter of controversies, decisions and actions, deserve brief consideration here. They are: (i) the agricultural orientation of rural primary schools; (ii) the rural youth organizations (iii) the vocational or practical agricultural schools and the farm training centres; (iv) the apprenticeship schemes in agriculture; (v) the agricultural extension services.

15. The agricultural orientation of rural primary schools is sometimes viewed as an application of the principles of adaptation of the rural boy to his environment and of education to real life. This seems to be a sound educational principle. Its application does not require to add an especial agricultural course and a specialized agricultural teacher. It is a matter of orienting the basic courses from arithmetics and natural sciences to civic education-towards an understanding of the actual life of plants and animals of the locality and of the problems facing the local human community in making use of existing resources, and in producing and distributing foods and raw materials. Their school garden and the raising of small animals would be a living laboratory through which new ideas and practices can be taught, from the germination of a seed to the utilization of vegetables for better nutrition. This would provide the rural boy or girl with new concepts, would develop his capacity to think and observe and would prepare him for his future learning, in or out of school. This would probably consult the interest of young people of school age, and would be useful to anyone, regardless of his future occupation. But this agricultural orientation of the primary school may lead to exaggerated expectations. One exaggerated purpose is that of developing incentives to keep rural people on the land. Preoccupied with the increasing migrations from rural to urban areas in developing societies, national leaders tend to believe that it is a matter of lack or faulty education in the primary school. Rural-urban migrations are not a matter of school curriculum, however, but the result of social and economic forces beyond the control of the school. Another exaggerated purpose is the use of the rural school to train the rural boys in new agricultural methods and techniques and to diffuse them in the community. This often results in making the school garden a place of meaningless hard labour, which develops negative attitudes. The more underdeveloped the community is, the more the school means for the local families an elevation of status and therefore greater possibilities of getting away from agriculture. In conclusion, the matter of the agricultural orientation

of the primary school deserves careful study and observation, should require well trained rural educators and should not so easily lead to superficial and exaggerated expectations. Otherwise it not only defeats its purposes but may imply considerable and unnecessary investment of financial resources.

16. Rural youth organizations have been initiated in many developing countries by the agricultural extension services. They provide a practical education to rural boys and girls leaving the primary school, who may have no other opportunities, unless they migrate to town. Even illiterate rural boys can profit from them. Through individual and group projects or activities they diffuse informations and develop skills, creative attitudes, civic virtues and a sense of individual and group responsibility. They may influence rural boys and girls from 12 to about 18 years of age, and their programmes not only take into account the living and working conditions of all members, but center around such interests. It is an informal education at a low cost. One agricultural extension agent, or educator, may serve many villages or neighbourhood groups of young people, without need for school buildings. Such programmes have great potentials in less developed countries. However, up to now, existing organizations have been too much a detailed copy of similar organizations in advanced countries. It is necessary to study the needs and problems of adolescents in developing rural societies and to develop methods and approaches which may help to offer a more systematic, but still practical, education. This requires greater cooperation between the schools and the agricultural or community development services. Rural youth organizations may be the centers around which new educational programmes can be initiated, such as literacy campaigns, short courses in specific subjects, or radio and television schools.

17. The training of the future farmers have been often attempted through vocational or practical agricultural schools. They differ widely in age-groups (from 12 to 18 years), in length of training (1 to 4 years), in entrance requirements, (from 3 to 8 years of primary education) and in type (boarding or day schools). They also differ widely in the number of students, in the number and variety of teachers, in the general or more specialized nature of the curriculum, in the number, size and types of buildings and in the possession of land and equipment.

Experience seems to indicate that-from the point of view of training better farmers for the future-such schools are neither effective nor efficient and that generally they offer a premature training, at a high cost to a relatively small percentage of farm population of those ages, who are likely to engage in non-agricultural occupations. Why? Let us point out some of our observations on this problem, not with a dogmatic attitude, but as hypothesis derived from experience, which should be subject to verification under a variety of economic and social conditions.

18. Such schools are often relatively expensive, due to their boarding facilities, the high annual wastage of students, the requirements in land, buildings and equipment, and the length of training. The result is that only a few schools can be organized, available only to a very small proportion of the farm boys, which means that the total economic and social impact is very limited, if at all noticeable. The investment could be justified, however, if the trainees were to become really farmers. But they are likely to leave agriculture, looking for "better" opportunities. This means that if most of the meager resources available for agricultural education are invested in these types of schools, we should conclude that the training was given precisely to those leaving agriculture, while no training at all was offered to those who really remain on the land.

The lower the level of general education in the rural areas and the higher the entrance requirements, the higher the probabilities that those enrolling in the agricultural school do so just looking for more educational opportunities which may enable them to enter other occupations. Having an education much above the majority is a selective factor in rural-urban migration, as it develops expectations, which the more ambitious tries to meet if he does not want to be considered "a failure". The boarding facilities and an extended training period also helps to change personal habits and attitudes different from the local farming community. The earlier the age of training, the more likely it is that the rural boy develops negative attitudes towards farming.

19. Age of training is an important factor. Educators may tell us that young people in adolescent years have interests other than learning a gainful occupation. Farming implies hard work and mature judgement, and adolescents are neither physically nor mentally fit to learn how to farm efficiently. For this reason it has been suggested that if training for farming is really wanted it should not be offered before 17 or 18 year of age, when farm boys - if still on the land - know what do they want and what chances are there for them to apply what they have learned.

20. The kind of training offered in the agricultural schools is another factor. It is not difficult to see schools where the training is centered around crops, animals, tools, equipment and practices which are unknown to the local communities, making it quite hard for the boy to apply on his farm such radical changes. The parents may reject the change, and they might be right.

21. But the effectiveness of agricultural schools does not only depend upon the factors mentioned above. The Agrarian structure and land tenure situation, or the lack of farm credit and other facilities, may result in abandonment of agriculture, regardless of the training received by the young farmer. If his father is a very small peasant farmer, the rural area does not offer any room for him to apply his new knowledge, unless the training programme is coordinated and is an important part of agrarian reform or settlement schemes. If his father is an unskilled worker in a large, traditionally oriented big farm, there will not be room for the more skilled worker, unless the large owner is in process of innovating and changing from the pattern of the traditional large farm to the pattern of the modern farm enterprise.

22. The preceeding considerations suggest that the type of effective and efficient training institution should take into account the conditions under which it exists and operates, and the kind and conditions of people receiving the training. The farm training centres offering systematically a series of short courses of different length and type, on different specific subjects according to the interest of the group, have been suggested as the most effective and less expensive type of training. Short courses may last halfday per week to several weeks or months. They may be organized for young or adult people, for men or women, for large or small producers, for individual farm operators or for farm workers, for literate or illiterate people. They may serve the farm people of a community, or a whole district, if boarding facilities are provided. They should have well trained instructors and be equipped according to the requirements of the training. Each short course should be very well planned, around an specific subject at a time, and during a year each centre should offer as many as possible of well planned short courses. The farm training centre should see that each individual farmer attends at different period several short courses. The number of the farm training centres should be estimated on the basis of the number of farmers and farm families to be served by each one.

23. The introduction of the apprenticeship systems used in industry into the agricultural field has received increased attention during the last years. It provides a strictly practical period of training in selected private enterprises or organizations, with some supervision by the farm training centre or the agricultural extension service. As Professor Harbison has indicated, the training potentialities of the private firms and enterprises should receive greater attention. (6) The apprenticeship system profits extensively from that potentiality.

24. The agricultural extension services of the ministries of agriculture are more and more improving their organization, personnel and methods to best serve the farming population. They are supposed to be educational institutions, although their education is highly informal, practical, and out-of-school. Although they have programmes for young people, their greater efforts are directed to the adults, men and women, farmers and their families. They operate through meetings, very short courses, demonstrations, tours, publications, and radio programmes. A great deal of applied social research is carried out regarding their methods, the diffusion and acceptance of new practices and techniques, or the role of rural leadership in training others and in changing existing ideas and attitudes. Agricultural extension services are expected to develop more in the future, to improve and intensify their methods and programmes and to get better coordinated with other agencies and institutions serving the rural population, such as agrarian reform programmes, cooperative services, and institutions for training in agriculture at different levels. Agricultural extension services often employ the largest numbers of agricultural personnel trained at the intermediate or higher lands.

(6) Harbison, F.H. - The Strategy of Human Resource Development in Modernizing Economies Report on the Policy Conference on Economic Growth and Investment in Education, 16-20 October 1961, Washington, D.C. Part III, The Challenge of Aid to Newly Developing Countries, pages 9 to 33, OECD. Paris.

25. At this point and as a final word regarding the training of the farming population it might be helpful to present a summary of the preceeding suggestions, in the form of a training ladder for farming:

Ages

- 6-12 years - Rural School (agricultural orientation)
- 12-18 , , - Rural youth organizations
- 17-20 , , - Apprenticeship (in selected farms)
- 17 and over - Farm Training centres (short courses)
- 20 and over - Extension work with adults.-

This unorthodox training ladder for farming population may be the object of considerable criticism and it is not necessary to anticipate them here. It is suggested, however, with the conviction that it is realistic, conducive to practical and effective training according to needs and of low per capita cost, permitting a flexible ~~accom~~modation to scarce resources in staffing, material facilities and financial possibilities. It is also easily adaptable to the great variations of interest and needs of different areas and regions and of different categories of people(7).

Training Intermediate Level Technicians

26. A number of important issues will be discussed here. They are: (i) the need for and functions of intermediate level technicians; (ii) Training for a job versus training for university entrance; (iii) relations with universities; (iv) entrance requirements; (v) coordinating training in different fields of food and agriculture; (vi) coordination with public and private institutions and service; (vii) agricultural orientation in secondary schools.

(7). Literature dealing with the training of young and adult farmers is now increasing considerably. The Organization for Economic Cooperation and Development (OECD) has published interesting works such as: Training of Young Farmers and Farm Workers, 1959 Series, num. 14; The Development of Agricultural Apprenticeship Schemes, 1961, No. 48.- The Rural Youth Movement and the Agricultural Extension Services also produce an increasing number of publications.

27. Education and training of intermediate level personnel is often an area of confusion and ill-defined purposes and policies, in spite of the fact that such trainees should play a tremendously important role in food and agricultural development in developing countries. It can be defined as that training offered in after six or nine years of general education, usually lasting for two or three years. They are usually the link between the farmer or producer and the university graduate. A review of institutions, services and enterprises utilizing trained personnel in agriculture (see section IV, paragraph 41 below) would easily indicate that they are the assistants and auxiliary personnel in many of them. They are the field agents or assistants of agricultural extension services, the animal health assistants, the forest rangers, the skilled workers in farm machinery, the organizers of cooperatives, etc. An analysis of qualitative requirements for personnel would review the needs of all those agricultural institutions and services. Quantitatively, it could be established, for planning purposes, that for every university graduate in a given field of food and agriculture there should be a given number of intermediate level trainees.

28. Intermediate level training in agriculture is given sometimes in general secondary schools offering specialized educational opportunities, or in specialized schools which also include general "cultural" courses. In other cases, such specialized schools limit themselves to offer specific technical training in one or more agricultural fields, fully taking into account the requirements of the jobs to which trainees are likely to enter upon graduation. Multiplicity of purposes sometimes leads to weak training. Training for farming, or for an agricultural occupation in the government or private service, or for entrance into the university, are multiple purposes of a number of existing institutions. The result is that they do not train well for either one.

Training for farming at such relatively high level of education, in countries where farming is done mostly by illiterate people, is certainly an illusion. No one, or very few, of such trainees will actually go back to farm. Training for a government job is more realistic, as government is their biggest labour market, unless agriculture is so developed that the supporting private services are able to absorb a significant number of intermediate level technicians.

Training for university entrance very often is found to be a purpose of intermediate agricultural schools. The argument is that this is the opportunity to open the door of universities to capable farm boys. This is also an illusion, if not a fallacy. Most students would try to enter the university, only to find out that their basic training is too weak. If the basic training is reinforced to make it equal to general secondary schools, the agricultural training suffers, making the graduates poor agricultural technicians. This is done at a high cost, as such schools are expensive, not only because they usually have to be boarding schools, but because of the specialized staffing and equipment, buildings and land required.

The result is that such intermediate agricultural schools do not actually open university entrance to farm boys, do not significantly solve the problem of securing of students agricultural faculties and do not satisfy the need for agricultural technicians in the right numbers and of the right quality.

29. Close coordination of intermediate schools with agricultural faculties of universities may be desirable in some cases. Staff and facilities of such faculties may be useful for instruction at the intermediate schools. This would mean economy in the use of scarce resources. On the other hand, wastage of students in university faculties - often very high - may be balanced if such students can enter the intermediate agricultural school.

30. Entrance requirements may therefore vary from 6 years of primary education to complete secondary education, depending upon the educational situation of the country, the requirements of the specialized training, or the urgency for trained personnel. Not only the educational background is important. The need to have students with real farm background and experience may require to lower the entrance requirements. Furthermore, age is also important. As graduates are immediately hired by government services such as agricultural extension, the technician should be mature enough to fulfill well the requirements of the job.

31. We may talk about multipurpose intermediate schools in a sense different from the one indicated above. It refers to training in the same institutions in different specialized fields of food and agriculture. If general and basic science courses are reduced to a minimum, as it is assumed that students already get a basic general education, the efforts and resources can be almost entirely directed to training in specific fields for specific occupations. Agronomy, horticulture, plant protection, animal health, animal husbandry, forestry, rural home economics, processing of farm products, etc., - to mention only a few - are fields which can be offered in the same institution, with some common courses and staff and with common use of general facilities. Furthermore, intermediate schools may offer a generalized technical training in agriculture, such as is required by the field extension officer, or a very specialized one, such as is required by a technician in farm mechanization, or in the processing of given types of farm products. The multipurpose intermediate schools may help to plan the use of existing resources in the most efficient way.

32. The fact that graduates of intermediate schools should receive specific training for specific occupations suggest the desirability of making a close coordination between them and the institutions and services, public and private which will employ the graduates. This will help to keep the training in line with actual needs, will readily open employment possibilities to graduates, will promote the support of the school by such services, either

financially, or with temporary staff and facilities for given purposes, or for organizing the periods of practical training of students. In some less developed countries, where private agricultural services and enterprises are likely to reject the agricultural graduate because he is "bookish" and "theorist", such coordination may help to change their attitude and lead them to employ the technically trained man.

33. If intermediate schools are somewhat detached from the general secondary schools, does it mean that the latter should completely ignore agriculture and its problems? Certainly not. On the contrary, given the economic and social importance of agriculture, forestry, fisheries and related fields, secondary schools should make students aware of the problems of agriculture and rural life. This would be the sense of an "agricultural orientation". Every citizen, regardless of his occupation or status in the community or in the nation as a whole, should receive such orientation. Everyone should know what the problems of the farmer are, how the community can get better organized to develop its agriculture, what is an agricultural extension service, or an agricultural experimental station, or a plant quarantine service. This would help secondary students to understand the role of science in agriculture and probably would awaken their desire to join the agricultural career. This would also lead the politicians and policy-makers towards a realization of the importance of the improvement of agriculture and rural life for the wellbeing of the nation.

Higher Education in Food and Agriculture

34. A number of problems and issues deserve brief discussion here. They are: (i) the need for and the functions of university graduates in food and agriculture; (ii) the coordination of different food and agricultural fields within the university; (iii) the relations with agricultural research and extension.

35. Most poor countries want and need a university. This institution makes it possible to have a selected although small group of well trained people permanently dedicated to study systematically the problems of the country and to train the leaders and policy-makers. This also applies to the fields of food and agriculture.

36. A review of the fields of food and agriculture (see section II, paragraph 7 above) shows that some university colleges and faculties have a direct interest in agriculture (agronomy, veterinary, forestry, rural home economies, agricultural engineering, etc.) while others have a marginal although still important interest (economics, sociology, etc.) In assessing requirements for personnel of a higher level for agricultural development, the role of each faculty and of each professional group should be fully taken into account. This does not mean that in every country all such faculties should be organized, as priorities have to be set, according to national conditions and resources. However, where such faculties emerge, they should be coordinated within the framework of the university. Such coordination means not only common use of some staff and facilities, but also the possibility of studying the different aspects of the agricultural problem from an inter-disciplinary point of view.

37. This coordination is easier if all faculties are in the same campus. This, however, does not in itself secure the coordination, as in some countries university faculties tend to be quite independent units, separated from the others. Agricultural faculties are more difficult to get into such coordination, because they tend to be located in rural areas, away from the university campus. This location helps to have agricultural research facilities and possibilities of practical training, although other things are lost, such as the exchange with other faculties, and common use of staff and facilities. This adds to the cost of agricultural faculties, which therefore have to develop their own administration, staff and physical facilities. The problem of having full-time staff becomes therefore more difficult to solve. The ideal combination would be to be located with other faculties on the same campus and at the same time have the required experimental and research facilities. This should be kept in mind by the planners of University education.

38. One important aspect of such coordination deserves mentioning and it is the desirability of offering the agricultural student the opportunity of having courses not only in the physical and biological sciences applied to agriculture but also in the economic, social and cultural aspects of agriculture and rural life. The importance of this coordination is leading in some countries to the organization of rural, agrarian or agricultural universities in which the whole body of science and technology applicable to agriculture is organized into an academic and research institution. Educational planners may want to give consideration to this new pattern in less developed countries.

39. The role of universities in research - development of new knowledge and in extension - diffusion of the available knowledge -, in less developed countries, is receiving increasing attention. This is the case of most faculties of universities, from agriculture to medicine, from economics to sociology.

In the fields of food and agriculture some people believe that the ideal is somewhat similar to the "Land-Grant Colleges and Universities" of the United States. Such universities began their development as rural or agricultural universities, in which agriculture and rural life was the main theme. It might be that the emerging rural universities in developing countries (agrarian university in Peru of the agricultural universities in Pakistan) may develop into a similar pattern in the future. However, recent attempts to develop agricultural faculties having the three function - education, research, extension - have not been very successful. Probably weak and isolated agricultural faculties, not yet developed to constitute well balanced and integrated agricultural universities, are not ready to assume total responsibility for education, research and extension in food and agriculture. Government services and institutions in developing countries often want to control the agricultural research and the agricultural extension services, and are not willing to give them up to autonomous universities. However, universities still can play an increasingly important role in research, especially that of a more fundamental nature, if they receive the help of interested public

and private bodies. This would increase the usefulness of university faculties, would justify more their claim for full-time and well-paid staff and would improve the quality of teaching. Similarly, agricultural faculties have an important role to play in extension, not only in training the technicians and leaders of such services, but also in studying their methods and problems. Research and extension for agricultural development should receive the contributions not only of the agricultural scientists but also of the researchers in social and economic fields. Therefore, not only for training purposes, but also for research and extension purposes, the coordination inside the university is necessary, the university acting as an integrated academic and research body.

IV - Estimating Requirements for Trained Personnel

40. The estimation of future requirements for trained manpower for economic and social development is a problem receiving increasing attention of development planners. ILO has the leadership in this matter within the United Nations agencies. The development of methods and techniques of estimation in the fields of food and agriculture presents special problems and FAO, in cooperation with other interested agencies, hopes to encourage efforts with this purpose. This section of this paper, does not pretend to discuss the matter fully or adequately. It limits itself to present some general observations (i) on the agricultural institutions and services utilising trained personnel in food and agriculture; (ii) on some methods of estimating requirements for personnel in these fields; (iii) on some factors affecting the absorptive capacity for trained personnel in food and agriculture.

The Agricultural Institutions and Services

41. In the study of agricultural education, research and extension in Latin America mentioned earlier, it is suggested to make an inventory of institutions, services and enterprises, public and private, which employ trained personnel. In that study it is therefore intended to find out who needs personnel, for what specific purposes, in what numbers, with what levels of training, with what kind of training. A prototype classification of institutions, services and enterprises is suggested, as follows: (8)

i) Formal educational institutions in all fields of food and agriculture
Practical schools and training centers, Intermediate schools, Colleges and faculties of universities, Advanced institutes.

ii) Informal educational services in food and agriculture
(governmental and non-governmental)

Agricultural extension services, Home economics services, Forestry services, Fisheries services, Food and nutrition services, Community development services, Agricultural information services. Agricultural products processing advisory services, Military services, Missions and similar religious bodies.

iii) Research and investigation services
(governmental and non-governmental)

Agricultural research services, Forest research institutes and services, Fisheries research institutes and services, Veterinary research institutes and services, Agricultural economics research institutes and services, Nutrition research institutes, Home economics research institutes Research institutes in rural sociology, Research institutes

(8) FAO - Study of Agricultural Education, Research and Extension in Latin America. - Rome, 1964 pp. 4 to 6.

in credit and cooperatives, Soil survey institutes, Food technology institutes, Statistical services, International research institutes and programmes.

iv) Regulatory services

Planning services, Agrarian reform institutes, Fisheries regulatory services, Forest and wild life regulatory services, Plant quarantine services, Soil conservation services, Water control services, Quality control of farm supplies, seeds, fertilizers, insecticides and feeding stuffs; Food control services, Marketing practices and standards, Animal health regulatory services.

v) Credit and cooperatives

(governmental and non-governmental)

Credit banks, Cooperative departments, Cooperatives associations

vi) Specialized technical services

Irrigation departments, Soil conservation services

vii) Farm, Forest and fisheries supplies services

Farm machinery services (public), Private supplies of farm machinery, fertilizers, insecticides, seeds and feed stuffs; Forest supplies, Fisheries supplies.

viii) Marketing services

Public marketing of farm products, Private distributors of farm products

ix) Processing of farm, forest and fisheries products

Processing of food products, Processing of fisheries products, Processing of forest products, Processing of industrial crop products, Rural industries.

x) Primary producers

Producers of farm commodities, Fisheries associations, Forest associations, farmers societies and organizations, Small producers.

42. Some observations should be made regarding the preceding list:

- xi) It does not mean at all that all countries have or should have such institutions and services. Some of them may never develop at all, because they are not needed, or because their functions may be taken over by other organizations. For example: the home economics extension service may, and often is, a part of the agricultural extension service; or the agricultural research services may include research in animal health, or agricultural economics, with no need for the existence of specialized research services in those or other fields.

ii) While some large private services or enterprises may be listed as separate entities for purposes of finding out their requirements for personnel, the mass of small producers of farm, forest and fisheries products cannot be individually added to that list. For purposes of estimation of manpower needs, they have to be ~~treated as~~ statistical categories, using appropriate statistical techniques.

43. The categories of personnel employed in each one of the institutions, services and enterprises indicated above, should also be investigated. Paragraph 6 above mentioned suggests three broad categories of personnel. This determination of the categories of personnel within each public or private institution or service is a useful basis to obtain an indication of the quantitative and qualitative needs for personnel, at present time and for the foreseeable future.

Methods of Estimating Needs for Personnel

44. Professor Harbison, of Princeton University, suggests three objectives of manpower analysis:

- (a) The identification of the principal critical shortages of skilled manpower in each major sector of the economy, and an analysis of the reasons for such shortages;
- (b) identification of surpluses, both of trained manpower as well as unskilled labor, and the reasons for such surpluses; and
- (c) The setting of targets for ~~human~~ resources development based upon reasonable expectations of growth (9);

45. The identification of critical shortages of manpower in agriculture, forestry and fisheries requires a survey of existing trained personnel and the needs of existing institutions, services and programmes. The identification of surpluses of skilled and unskilled manpower in agriculture, and its causes, is again an important question deserving analysis. The setting of targets for trained personnel in food and agriculture requires the use of realistic approaches to estimation of needs, taking into account actual training possibilities and the capacity of the country to absorb trained personnel.

46. Both short-term (i.e. 5 to 10 years) and long-term (i.e. 10 years or more) targets should be considered in agricultural education planning. Short-term targets are those dictated by existing or prospective agricultural development plans, programmes and projects. The magnitude and kind of plans, and the existing situation regarding available personnel with adequate training, would indicate the extent to which the financial resources available for agricultural development should be invested in education and training in food and agricultural matters.

(9) Harbison, F.H. - op. cit. p. 18

Present and prospective needs for personnel, however, are usually such that training institutions cannot supply them in a short period of time, which means that even such needs require long-time planning. Therefore, long-term targets should consider two aspects :

- (a) long-term satisfactions of existing and prospective needs;
- (b) a percentage increase of present needs, to satisfy future requirements.

47. The proposed method includes two main aspects:

(A) Macro-socio-economic indicators and relationships:

Use of macro-socio-economic indicators, ratios or coefficients, based on relationships between given economic and social factors and personnel requirements.

(B) Use of known relationships based on the accumulated working experience of institutions and services:

- (a) the number of people of higher levels and the numbers of people of inter-mediate and lower levels, in accord with requirements for effective supervision.
- (b) the number of people of a higher, intermediate or lower level that is required, as follows:
 - (i) Number of farmers or farm families per officer;
 - (ii) Political divisions: states, provinces, municipalities, and number of officers required to serve them.
 - (iii) Physical criteria: number of items (e.g. animals), or number of farms, or geographical area, etc., per officer;

Macro-economic indicators

48. The use of broad indicators of manpower needs is a common technique in manpower forecasting and is usually based on population growth.

Tinbergen and Bos⁽¹⁰⁾ say that in less developed countries estimation of manpower on the basis of national production plans is difficult, because usually there are not long-term economic plans and because knowledge of the relationship between input of skilled labour and output of goods is almost non-existent. They add that even the much more modest aim of relating the number of scientists and technologists to total output encounters

(10) J. Tinbergen and H.C. Bos-The Global Demand for Higher and Secondary Education in the Underdeveloped Countries in the Next Decade- Report of the policy Conference on Economic Growth and Investment in Education, Washington, 16 to 20 October 1961. III pp. 73-76-OECD, Paris, 1961.

difficulties which cannot be overcome without much more elaborate study. For these reasons they suggest a very rough way of estimating future targets, which is based on:

- i) Number of students in a base year for which complete statistical information is available
- ii) the population growth between the base year and the target year
- iii) the desired increase in enrolment ratios between the base-year and the target year.

49. The authors add that in order to maintain the present (base-year) ratio between the number of students and the total population, enrolment will have to increase by the same percentages. However, it is not a question of maintaining the present ratios, but of raising them. Immediately after, they established that there is a relationship between income levels and enrolment ratios and suggest different percentage annual increases in enrolment ratios according to per capita income levels of different countries assuming an average increase in per capita income of two percent per annum during the decade 1960-70. These assumptions, together with the data for the base-year and the anticipated growth in populations, make it possible to calculate the number of higher and secondary students in the target year (1970).

50. SVIMEZ (Associazione per lo sviluppo dell'industria nel Mezzogiorno) in Italy, made a more comprehensive estimation of 1975 targets of trained manpower, including industry, agriculture and general services. This study not only make quantitative estimates, but also analyses the employment structure in 1961 and 1975 and suggests changes in the school system (11)

51. Paragraphs 48 to 50 above make reference to important studies made on the overall estimation of manpower needs. Such studies, however, do not satisfy the specific needs of the agricultural education system, which expects to be told in what specific fields of food and agriculture people should be trained, in what numbers, at which levels, in what kind of institutions.

Direct Information of Institutions and Services

52. The direct information from institutions and services also has advantages and disadvantages. The advantages are: (a) Permits estimation, on short-term but very specific basis, the number and kind of people needed, according to budgets; (b) Permits inquiring into the weaknesses and qualitative aspects of existing personnel, the additional training needed, the kind of people missing and the level and quality of new personnel required; (c) Permits to check and verify, on the basis of the nature of the work and national conditions, the relationships mentioned in paragraph 47 above. The disadvantages

(11) SVIMEZ Trained Manpower Requirements for Economic Development of Italy, Targets for 1975 - Giuffr  Editore, Roma, 1961.

are: (a) Prediction is not possible on long-term basis; (b) Existing services may rapidly change in their structure, purposes, plans and budgets, or may disappear, or new services may appear shortly afterward; (c) if a complete coverage is made, the method is complex and entails a good deal of work in collecting and manipulating data.

An illustration: the agricultural extension service

53. The agricultural extension service may give us an hypothetical illustration of how the direct information obtained from an institution or service may serve to estimate actual needs for trained personnel, as follows:

(A) For political, administrative or agricultural reasons the local political unit (municipality, district, or community) may be considered in a given country the organizational unit of the extension programme.

a- Let us assume that in an average municipality there are 2,000 farm families, that they include 2,000 farmers, 2,000 farm wives, 3,000 boys and 3,000 girls of 13 to 18 years of age, that every municipality wants to have or should have an agricultural extension office.

b- Let us also assume that in the country as a whole there are 100 of such municipalities, with a total of 200,000 farm families, including the same number of farmers and farm-wives, and 300,000 farm boys and the same number of farm girls aged 13 to 18 years.

c- Let us also assume that each municipality wants to have extension programmes for adults and rural youth of both sexes.

(B) The Extension programme may operate at different levels of intensity, according to the requirements of existing agricultural development programmes, availability of trained personnel and financial resources. The level of intensity is measured here in terms of number and kind of extension staff in the municipal office and therefore in the number of farmers, farm wives, or rural boys or girls, per officer. Rural boys and girls are assumed to be organized into rural youth clubs. The staff of the municipal extension office may consist of a chief agricultural officer, agricultural assistants for male rural youth, home economics assistant for adult women and another one for female rural youth. The estimated staff to cover the country as a whole would be as follows for each level of intensity of the extension programme:

IDEP/CAIRO/10.3/Ag

Extension staff [*] Extension staff [*]	No.	Level 1 Population Officer	Total staff	No.	Level 2 Population Officer	Total staff	No.	Level 3 Population Officer	Total staff
Chief Agric. Officer	1		100	1		100	1		100
Agric. assistant (adults)	2	1,000	200	4	500	400	10	200	1,000
Agric. assistant (youth)	1	3,000	100	2	1,500	200	4	750	400
Assistant home Economist (Adults)	1	2,000	100	2	1,000	200	4	500	400
Assistant home Economist (youth)	-	-	-	1	3,000	100	2	1,500	200
Total staff-Agric.			400			700			1,500
Home Economist			100			300			600

* The Chief agricultural officer can be assumed to be a college or faculty graduate. The other staff in agriculture or home economics can be assumed to be of an intermediate level.

54. The agricultural officer, chief of the municipal extension office, would work with the 2,000 adult farmers directly and would supervise the work of 4, 9 or 20 assistant staff in agriculture and home economics, depending upon the level of intensity of the work. The number of assistants available would determine the extent to which he has to work mostly through them. There is a limit in the number of assistants he can effectively supervise, which is influenced by local circumstances.

55. Three additional observations should be made at this point. First, the increasing intensity of the extension programme at the municipal level, until it reaches level number 3, may take a number of years, according to the agricultural development plans; second, such increased intensity may be conditioned to the output of trained personnel, to be added to the existing one at the beginning stage; or the output of trainees by schools may be conditioned to the requirements of the extension programme. Third, it should be mentioned that increased intensity of work at the municipal level would require increased staff at the provincial or national extension offices, mostly supervisors and subject-matter specialists. This should be added to the total requirements for personnel.

56. The preceding example is presented only for illustrative purposes. It does not pretend to convey a reality and it might not be completely in line with sound principles of extension organization and supervision. It indicates, however, how the close study of the needs of a particular service might be useful, taking into account the working experience of the institution and the intensity or purposes of the national development programmes in agriculture.

The absorptive capacity for trained personnel

An over-supply of educated persons is a familiar feature in poor countries, according to W.A. Lewis. He adds that this is partly due to (a) the education system producing the wrong kinds of education and (b) their high price, poor countries being unable to pay them or absorb in large numbers but, as the premium for education falls, the market for the educated may widen enormously (12)

In the preceding sections of this paper we have discussed the institutions which might provide the right kind of education in food agriculture and the need to associate the training with the actual quantitative and qualitative needs for trained personnel as they are felt by public and private agricultural institutions and services. The wrong kind of institutions may produce an over-supply of agriculturally educated people which does not find a labour market.

Training of future farmers at an early age and at a level much above the existing level of general education and in expensive schools providing a long period of training, result in unemployed "gentlemen farmers". On the other hand, if other conditions are not modified, such as the land tenure situation, the provision of credit and other facilities and a well organized agricultural extension work, the outcome might be equally frustrating.

(12) Lewis, W.A.;- Priorities for Educational Expansion - Report on the Policy Conference on Economic Growth and Investment in Education, Part III. The Challenge of Aid to Newly Developing Countries. OECD, Paris, Pages 36 to 38.

The intermediate level personnel might be satisfactory because it does not demand a high price and can more easily adjust to living and working under the conditions of the village of peasants. If the school tries, however, to open for them the doors of universities, most of them will find themselves unemployed, either because the university accepted only a few of them or because the prospective employer did not find them qualified enough for a job or because they demand higher prices for their work.

As agriculture improves, both public and private institutions and enterprises will more and more require the services of the trained man. It is well known that in areas where agriculture is fully traditional, the private enterprise does not see the need to hire a trained agriculturist but, as agriculture evolves and changes its methods, the need for the man trained in such new methods is more strongly felt. From this point on, the private business compete advantageously with the public service, as the former pays higher salaries or offers more stability.

The gradual replacement of the lower level technician by one of higher training is another matter. While the former are useful in the first stages of development because they are paid lower salaries and because agriculture still does not require high level of training to work at the village level, the evolution of agriculture gradually requires the contributions of better trained technicians, until the lower levels of training completely disappear. This implies not precisely the acceptance of lower salaries by higher personnel, as W.A. Lewis seems to suggest, but a capacity of the country to pay higher salaries to agricultural staff. Professions and occupations with lower social prestige - such as agriculture - are always paid lower salaries which result in agricultural training institutions having few students or in abandonment of the agricultural career for better paid occupations.

The importance attached to agriculture in economic development plans and the degree of organization for agricultural development are factors influencing the capacity of the public and private services to absorb trained personnel. It is certainly inconsistent for a country to organize many agricultural schools if at the same time the programmes for agricultural development remain static, are unable to employ personnel, or the conditions for a successful farming occupation remain as unfavourable as before. If public services for agricultural development are not well organized, do not offer stability and fair working conditions and do not offer opportunities for a successful career to capable young men, agricultural schools will continue to work below their enrolment capacity or will turn out graduates which the country cannot absorb.