A STUDY OF PRE-SERVICE PROFESSIONAL DEVELOPMENT NEEDS FOR AGRICULTURAL EXTENSION OFFICERS IN GHANA

Dissertation for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY

JOSHUA KWAO GEKER

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of the requirements for

Ph.D. degree in Education

Frank Bobbitt
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Date October 27, 1976

O-7639

~~APR 24 79~~ 109

~~APR 23 '84~~ 115

~~MAY 08 '84~~ 129

~~MAY 22 '84~~ 145

158

OCT 05 '87

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ABSTRACT

A STUDY OF PRE-SERVICE PROFESSIONAL DEVELOPMENT NEEDS FOR AGRICULTURAL EXTENSION OFFICERS IN GHANA

By

Joshua Kwao Geker

Objective of the Study

The general objective of the study was to identify the pre-service training needs for agricultural extension officers in Ghana. The specific purpose of this study was to examine the differences between agricultural extension officer college groups, tenure groups and region groups; differences between faculty of agricultural college groups and differences between agricultural extension officers, agricultural extension supervisors and faculty of the three agricultural colleges in Ghana in relation to training needs for extension officers in nine competency areas. The areas were: (1) Extension organization and administration, (2) Human development, (3) Educational process, (4) Social systems, (5) Program planning and development, (6) Communication, (7) Effective thinking, (8) Technical knowledge, and (9) Research and evaluation.

Method of Investigation

The method involved identifying training needs through a review of literature on the subject and constructing a survey instrument based on the literature review for use in the study. Respondents for the study included a random and stratified sample of agricultural extension officers, a random sample of agricultural extension supervisors and all the teaching staff of the three agricultural colleges in Ghana. The general sample was comprised of 240 agricultural extension officers, 48 agricultural extension supervisors, and 24 teaching staff of the three agricultural colleges.

Data for the study were collected through questionnaires administered by the author and two research assistants. The data collected were analyzed using one-way analysis of variance and Tukey post hoc procedures to isolate pairwise differences. An alpha level of 0.05 was chosen for the rejection of each null hypothesis.

Summary of the Findings

1. When faculty of agricultural college groups were compared, there was a general agreement that it was important for a beginning agricultural extension officer to be competent in the nine competency areas; that the nine areas should be included in the pre-service training program and that training in the areas should be the responsibility of the agricultural colleges.

2. When agricultural extension officers were compared by college groups, there was the indication that the competency areas were important, that extension officers need to have knowledge about them and that the competence possessed in the areas was acquired at the agricultural colleges.

3. When the opinions of agricultural extension officers were compared by tenure groups, there was the general agreement that the nine competency areas were important to be included in the pre-service training program; that beginning extension officers need to have competence in the areas and that the competence possessed in the areas by serving extension officers was acquired at the agricultural colleges. The 10-year tenure group indicated a higher degree of competence in the nine competency areas over the 2-5 years and 6-9 years tenure groups. This difference could be attributed to the longer length of service and field experience of the respondents in the 10-year group. This seemed to indicate that the longer the length of service and the more the field experience acquired, the more an extension officer felt he was competent in extension work.

4. When agricultural extension officers were compared by regions, there was the general agreement that beginning agricultural extention officers need to have competence in the nine competency areas and that the areas need to be included in the pre-service training program for prospective agricultural extension officers. The higher degree of

competence in the nine competency areas indicated by respondents in Ashanti, Western and Eastern regions over respondents in the other regions, could be attributed to differences in the degree of field experience acquired by respondents in the various regions.

The regional differences shown in the degree of importance and the degree of competence extension officers possessed in the nine competency areas should be considered when in-service training programs are being drawn for serving agricultural extension officers.

5. Senior technical officers indicated that the nine competency areas were important to be included in the pre-service training programs for agricultural extension officers. They also indicated that extension officers need training in the areas and that such a training should be the responsibility of the agricultural colleges. In the opinion of the senior technical officers, extension officers working under them had a below average degree of competence in the competency areas. This led me to believe that serving extension officers need training in the nine competency areas through in-service training programs.

6. When the three populations (1) agricultural extension officers, (2) agricultural extension supervisors, and (3) faculty of the three agricultural colleges were compared there was a disagreement in respect to the need for extension officer training in the areas of effective thinking, technical subject matter and research and evaluation. There

were also differences on when training should be given in the areas of effective thinking, technical subject matter, social systems and program planning and development. The three populations also differed in the perceived degree of importance of the areas of extension organization and administration, educational process, social systems, communication, effective thinking, technical subject matter, human development and research and evaluation.

The differences between the groups showed that though they were all involved in extension work, they could not agree on the type of training that should be given to prospective agricultural extension officers and those already engaged in extension work. The findings of this study should enable all the groups involved in extension work to come together to develop a more compatible training program for agricultural extension officers.

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1976

ACKNOWLEDGMENTS

The author is deeply indepted to many individuals who made valuable contributions to this research study.

Special thanks go to Dr. Frank Bobbit who directed the dissertation and served as the chairman of the Doctoral Guidance Committee. The author is grateful for his support, wise advice, and able assistance.

In addition, sincere thanks go to the other members of the Guidance Committee: Dr. Carl Gross, Dr. Ruth Hamilton, and Dr. Eugene Trotter for their interest, helpful suggestions, and cooperation.

A sincere note of thanks is given to Dr. O. Donald Meaders who acted as the Chairman of the Guidance Committee until his departure for Napel on university assignment and Dr. Bob Wilson of the Research and Consultation Department for his help with statistical procedures.

Finally, the author is grateful to the Africa-American Institute for sponsoring his research and graduate studies in the United States of America.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER I

INTRODUCTION

Ghana like other developing countries is faced with the problem of introducing modern technology into the country's agriculture. This is important because the country derives its well being to a great extent on agricultural pursuits. The country has to expand and increase its agricultural production in order to compete in the international market, to be self-sufficient in food production and in order to raise the living standard and the economic position of the farmers.

In Ghana today, there are government programs and projects aimed at increasing agricultural productivity. In order to achieve success in these programs, it is important to have a well trained and qualified agricultural extension personnel because the agricultural extension service is an important means through which agricultural development can be achieved.

It is an accepted fact that competent, well trained and qualified personnel is a factor that affects the success or failure of any program. Ghana needs agricultural extension officers capable of assisting farmers in

acquiring the knowledge and skills required in modern agriculture. The fundamental need to improve the profitability and efficiency of the country's agriculture by incorporation of relevant levels of technology provides the dimensions for the training of agricultural personnel to assist the farmer in increasing his productivity.

By examining the reactions of extension officers, their supervisors and faculty of Agricultural Training Colleges to the training needs of agricultural extension officers, it is hoped that the objective of this study which is the identification of pre-service professional development needs for Agricultural Extension Officers in Ghana could be achieved.

Background of the Study

Ghana with a population of about 10 million and a total area of 92,873 square miles is predominantly an agrarian country. Agriculture has remained from the beginning of time the most important economic activity. Agriculture now engages about 80 percent of the country's labor force. It is estimated that Agriculture's total contribution to the Gross National Product is about 50 percent. It also supplies over 70 percent of the country's exports. It is therefore not surprising to note that governments over the years have tried to make the Agricultural Extension Service the educational wing of the Ministry of Agriculture, more effective in educating and

helping the small-scale farmers (who carry on over 90 percent of farming activities in the country) to improve their farming methods and thereby increasing their production and consequently raising their standard of living. In order to achieve this, it is very important to have well trained and qualified agricultural extension personnel. The fact that the success or failure of every program be it agricultural or not depends on a well trained personnel cannot be overemphasized.

The Ghana Agricultural Extension Service has been accused on many occasions for being ineffective. One of the reasons often given for its ineffectiveness is the incompetency of the extension officers. Ghana still needs more well trained agricultural extension officers to help in the country's "Operation Feed Yourself," "Operation Feed Your Industries" and other agricultural development programs. The purpose of this study is to identify the professional pre-service training needs of Ghananian agricultural extension officers. It is my hope that this will help the Agricultural authorities in planning effective pre-service training programs for prospective extension officers. The findings may also help in planning in-service training programs for serving extension officers.

Agricultural Extension in Ghana

The Agricultural 'Extension' Service was introduced into Ghana in the nineteenth century by the Basel

Missionaries. The Missionaries established gardens at Akropong Akwapim in 1856 and "experimented with crops; employed men and women in their gardens in order to teach them a 'way of farming.'"[1] In 1890 the Aburi Botanical Garden was opened and a Department of Agriculture was established. Even though the results of experiments and experiences of trained professional staff from the Aburi Garden were transmitted to the farmer this was considered an incidental activity as "Colonial Agriculture with reference to extension work was geared towards the promotion of Industrial crops for Western European Markets."[2] The main objectives for which the Aburi Botanical Garden was established were: "(1) To explore the agricultural resources of the country but with views to finding suitable economic plants for European Markets; (2) To experiment upon both economic and decorative plants from other tropical and sub-tropical countries with the aim of finding out decorative plants that could thrive under local conditions, and also to teach scientific methods of agriculture."[3]

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[1]La Anyane, Ghana Agriculture, Oxford University Press, 1963, p. 2.

[2]Dumor, E. E. K., "Development of Agricultural Extension: A Search for Strategy." A paper delivered at the International Seminar on Socio-Economic Problems of Rural Development at the University of Cape Coast, Ghana, 5th January 1976.

[3]Agricultural Extension and Advisory Work with special reference to the Colonies, London Colonial Report No. 241, 1949, p. 28.

A despatch from the Colonial office on the opening of the Aburi Botanical Garden states that:

> It was mainly with a view of teaching the natives to cultivate the economic plants in a systematic manner for purposes of export that I have contemplated for some time the establishment of an agricultural and botanical farm and garden where valuable plants could be raised and distributed in large numbers to the people in the neighbourhood in the first instance and afterwards sent further into the country by pupils whom I contemplate taking from the schools when willing to give their attention to industrial pursuits. By their labour and agency when sufficiently educated for the purpose, additional farms or gardens could be started and by these means the people generally would become acquainted with the fact that other products than these indigenous to the country had been introduced into it were thriving and would be renumerative, and thus observing the advantage to be gained by their propagation would be disposed to cultivate them. By this mode of procedure, I trust that in time it will be possible to raise sufficient quantities of new production which may in the not too distant future add considerably to the value of the exports from the colony.[4]

Though one of the objectives for establishing agricultural stations was to teach the people scientific methods of agriculture, no significant attempt was made to improve methods of crop production. The reason for this is that the botanic gardens or agricultural stations were established to assist in the development of the agricultural resources of the country, chiefly with the views to increasing the production of economic products suitable for the European markets, and incidentally to educate the natives in more scientific methods of agriculture. "The

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[4]A Despatch from His Excellency Sir W. Brandford Griffith, K.C.M.G. Governor of the Gold Coast. August 1888. Colonies, London Colonial Report No. 241, 1949.

time has not yet arrived when much attention need to be given to the native food crops of the colony--at least so far as they are wanted for local consumption--as in a thinly populated country highly blessed by nature the natives have no difficulty in raising all the food stuffs they require; but it is obvious that in the near future, with an increasing population, and owing to the wasteful system of farming practised, more attention should be given to this subject and particularly to the adoption of suitable rotations of crops."[5] La Anyane observed that

> An aspect of the Extension Service which gained importance from 1904 onwards, was exhibition. The preparation of a representative of agricultural and forest products for the St. Louis Exhibition in the United States of America organized in 1904. The products exhibited were palm products, cocoa, rubber, Kola nuts, coffee, guinea, and timber.[6]

The first Agricultural show held in Ghana took place in Accra on the 21st and 22nd November, 1905.

From 1911 an attempt was made by the Department of Agriculture to encourage school leavers to take up farming. School gardens were considered as the means of achieving this objective. Classes were organized at all the agricultural stations for school teachers and their students. Free issue of tools, plants, seeds, publications, and

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[5]Dumor, E. E. K., op. cit.

[6]La Anyane, S., op. cit., p. 2.

advice from the Department of Agriculture were given to registered schools.

From 1920 to 1946 greater emphasis in extension work was laid on agricultural education and committees. La Anyane observed that a development in the organization of production and agricultural extension was the setting up of model farms in the central, Ashanti and Northern Regions devised to encourage the chiefs to pay greater attention to farming in their communities.[7]

The widespread development of the cocoa industry necessitated the expansion of extension work in this field. By 1917 twenty-eight local instructors (extension officers) were trained to work with cocoa farmers in Southern Ghana and Ashanti.

In 1927, District Agricultural Committees were formed as advisory bodies and a move was made to extend the system to village agricultural societies. The village agricultural societies revived the idea of unit farms, combining growing of food crops and cash crops with the keeping of livestock to demonstrate the possibility of a farming plan which could replace shifting cultivation.

The most successful extension program organized by the Extension Service was the scheme to control the spread of swollen shoot disease and capsids on cocoa. The swollen shoot campaign based on research work by the

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[7]La Anyane, S., op. cit., p. 3.

Ministry of Agriculture and the then West African Cocoa Research Institute, met with considerable opposition from farmers at first due to cutting of infected cocoa trees. The later success of the scheme owed much to the efficient way the extension service handled and dealt with the situation. New methods of production were demonstrated on a number of cocoa stations, new plots were established throughout the cocoa producing areas and farmers were educated on how to mix and spray insecticides in the control of capsids.

It is clear from what has been said so far that the small-scale efforts made during the colonial period or pre-independence period were directed towards the improvement and increased production of cash crops. Food production was neglected. It was therefore no surprise that "by 1948-49 food prices rose sharply and the food price index showed a rise of 45 percent. Between 1950 and 1951 there was a further increase of 25 percent."[8] Though imports of wheat, rose from 5,053 tons to 21,987 tons and 10,000 tons of rice and 24,170 tons of maize were imported, the annual report of the Department of Agriculture showed that "some 70,000 tons of cereal equivalent were still needed to feed the population."[9]

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[8]Johnston, Staple Food Economics of Western Tropical Africa. Stanford University Press, Second Edition, 1963, pp. 5-6.

[9]Annual Report, Department of Agriculture, 1949-1950.

Dumor points out in his paper that

> The only visible attempt at food crop extension in the face of shortage in urban food supplies and steep increases in food prices, was the appointment in 1949, of a Food Production Commissioner to coordinate an extension campaign to ensure the self-sufficiency of the country in food stuffs. In addition to this, 25 District Agricultural Committees were formed and their duty was to appoint and direct Food Advisors who will maintain liaison with the farmers.[10]

Dumor observed that though all efforts were being made to increase food production, no attempts were made to provide institutional framework in which to carry out extension plans.

The Colonial Department of Agriculture neglected a very important tool for the promotion, improvement and development of the country's agriculture--the Agricultural Extension Service. Nothing sums up the attitude of the Colonial Department of Agriculture better than the following:

> Gold Coast Agriculture is not sound. The quality of produce is not good, the system of marketing is bad, and the soil is neglected. New crops and new methods are not adopted readily enough or quickly enough by the farmers. There can be no real improvement until the farmers organize themselves into agricultural cooperatives, and learn how to handle and finance their farms, and their industries. Until then, agricultural instruction is largely a waste of time and money.[11]

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[10]Dumor, E. E. K., "Development of Agricultural Extension: A Search for Strategy." A paper delivered at the International Seminar on Socio-Economic Problems of Rural Development at the University of Cape Coast, Ghana, 5th January 1976.

[11]Department of Agriculture, Gold Coast Farmer, No. 2, June, 1932, p. 25.

The post independence period saw the move towards the formation of a strong and unified extension service to educate the farmers in the production of not only cash crops but also food crops.

Between 1958 and 1961 an Extension Commissioner was appointed to carry on the following duties:

1. Serve as a focal point for Extension planning programme direction and reporting.
2. Serve as coordinator and programme supervisor to Extension Officers.
3. Coordinate the work of the several Divisions in Extension.
4. Make recommendations to the Chief Cocoa Officer, Chief Agricultural Officer and Chief Fisheries Officer regarding staff movements and requirements.
5. Keep the Permanent Secretary and the Division Chiefs informed on Extension activities and submit all proposals which require financial and administrative support for the Regional Extension Officers for approval.
6. Prepare plans and proposals on in-service training in the regions.

The commissioner was to work with the Head Office staff under the Chief Agricultural Officer and with the field staff after consultations with Divisional Heads. Dumor observed that the Extension Commissioner had no

staff, no vote and no clear-cut authorization or procedural policy to follow. There was no administrative directive to Heads of Divisions and Extension Commissioner with regards to line of authority. This anomaly was later corrected.

The Department of Agriculture was abolished in 1959 and four divisions created under a Minister in a Ministry of Agriculture. Under the advice of F.A.O. and United States of America agricultural experts the General Agriculture Services Division was made responsible for agricultural extension work.

In the later part of 1962 the four divisions under the Minister were abolished "because they were not meeting the food needs of the country."[12] The failure of the Divisions could be attributed to the general lack of administrative competence coupled with weak organizational structure as well as political and social problems.

Continuous political pressure on the entire agricultural scene in the country led to the establishment of the United Ghana Farmers Cooperative Council (U.G.F.C.C.) which took over the section of the General Agricultural Services Division charged with extension work. Dumor observed that

> the rationale behind the takeover was that individual farmers scattered all over the country could not be effectively helped when one considered the financial

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[12]Dumor, E. E. K., op. cit.

and manpower requirements. Cooperative extension work in which an extension officer supervised the farm operations of cooperators would appear an easier approach to the enormous agricultural problem. The extension services was therefore to carry out the following functions:

1. To assist cooperative individual and settlement farmers in planning and directing their farm operations on modern lines, e.g., correct spacing, seed dressing, rotation of crops, fertilizer application, insecticides, etc.
2. To lead cooperative individual and settlement farmers to make use of loans-in-kind services, which the U.G.F.C.C. gives to farmers, e.g., lending of tractors and farm machinery, supply of loan, of fertilizers, insecticides, seeds, etc.
3. Establish nurseries for the propagation of improved planting materials like rubber and oil palm seeds imported for planting and distribution of seedlings to farmers.
4. To supervise the F.A.O. Fertilizer Trials. To enable it to carry out these functions, the extension or production unit was supported by machine and tractor stations in the various districts, fertilizer distribution, marketing and storage organizations.[13]

Because of the political situation in the country, it was obvious that those who enjoyed the fruits of the scanty extension services were those farmers who supported government policies and political activities. It should be noted that the U.G.F.C.C. which was also charged with organizing farmers into cooperatives lacked trained extension personnel.

A separate Extension Division came into being by a Cabinet decision in August 1964 but it was not before January 1965 that a nucleus staff was assembled and posted throughout the country. However, there were no agricultural

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[13]Dumor, E. E. K., op. cit.

extension centres from which to operate, neither were there facilities for any of the numerous technical innovations which must be brought to the farmers. Even offices where staff could plan and organize their programs were lacking. Added to these was the lack of transport which restricted the movement of extension workers and made it difficult if not impossible for them to reach as many farmers as was needed.

Soon after the change of government in 1966 by a Military Coup, the Division of crop production was established. This division was made up of Extension Services, Seed Multiplication, Farm Mechanization, Plant Protection and Quarantine and Stores Units. Extension work had to be done by the Crop Production Officers. There were the Regional Offices manned by Regional Crop Production Officers and forty District Offices manned by trained Extension Officers throughout the country. The districts were further divided into a number of sub-districts each manned by a Technical Officer. (See page 14 for Map of Ghana showing the present Agricultural Extension Districts.)

On the performance of the Crop Production Division, Dumor has this to say.

> There appeared to be lack of effective coordination between the various units and the regional officer. Evidence indicates that this lack of coordination was due to the fact that the Divisional Agricultural Officers preferred to refer matters concerning their divisions directly to their heads in Accra rather than taking instructions from the regional officers. The regional officer had very little control and knowledge

AGRICULTURAL EXTENSION DISTRICTS.
GHANA

> of what others were doing and in fact it was only administrative matters which received his attention. He had no control over the estimates for each head of unit in Accra controlled votes for divisions at the regional level. Furthermore, the regional officer did not really have an establishment of his own and invariably had to depend on the District officers for the provision of certain services.[14]

As far as extension work during the post independence period is concerned, Dumor observed that

> It was more of a proliferation of a series of programmes. Extension policies and programmes during this period appeared much more fragmented to such a degree that it was extremely difficult for the Extension Service to monitor the areas in which progress is being made. In any case, the compound effect of these programmes seems to suggest a neglect of the small scale holders which they were meant to help.[15]

Nothing can explain the present organization of the Ministry of Agriculture more clearly than the second paragraph of the Memorandum on the 1975-76 Estimates of Consolidated Fund Expenditure under Heads of Departments controlled by the Ministry of Agriculture:

> With increasing emphasis on rapid and orderly development of all aspects of agriculture it has become necessary towards the end of the 1974-75 financial year to carry out a further reorganization of the Ministry by creating six specialized departments. The six departments of Agriculture: Animal Husbandry, Veterinary Services, Fisheries, Irrigation, and Agricultural Mechanization and Transport are each headed by a Director at the national level. At the regional level each Department has its regional head who is responsible to the national head on professional matters. The Principal Secretary's Office coordinates the activities of these six departments at the national level. In this reorganization the Planning Division and the Publicity and Information Unit have been transferred to the Principal Secretary's office to

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[14] Ibid. [15] Ibid.

facilitate their servicing all the departments effectively.[16]

Under the new arrangement the Extension Service is put under the General Agriculture Department which has been charged with the responsibility of formulating and directing policies which would ensure the optimum utilization of the country's natural resources for increased production of food to feed the nation and adequate raw materials for use by the agro-based industries. These policies would also promote the diversification and increase of exports as additional sources of foreign exchange earnings.

Purpose of the Study

The primary purpose of this study was to identify the pre-service professional development needs of Agricultural Extension Officers/Technical Officers in Ghana as reflected by the reaction of (1) the Technical Officers themselves; (2) Senior Technical Officers (Supervisors of the Technical Officers) and (3) Faculties of Agricultural Training Colleges to competency areas of training identified as important to the preparation of Extension Officers for extension work.

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[16]Ghana: The Annual Estimates for 1976-77. Part I. The Consolidated Fund. Vol. II. Agriculture: Budget Division Ministry of Finance Accra, July 1975, p. 1.

Need for the Study

An effective extension program should take into account the competency of the extension personnel running the program. With this in mind, it appears reasonable to expect that training programs designed to prepare extension officers to be proficient, effective and competent in extension work would need to be based on identified training needs of the extension officers. From information gathered on training needs, training programs that would take into account the actual needs of the extension officers could be planned. This can be done by working on the basic assumption that more effective agricultural extension officer training programs could be planned if more knowledge were made available by experienced practicing extension officers on their training needs. This study is aimed at identifying extension officer pre-service training needs as perceived by practicing extension officers.

Briefly, the need for this study may be summarized as follows:

1. There is a need to identify in a formalized way the pre-service training needs of agricultural extension officers in Ghana. If agricultural extension officers are to be competent and effective in their work, there should be guidelines based on facts rather than on opinions for establishing their training needs.

2. There is the need to produce efficient and competent agricultural extension officers to help the Ghananian farmers improve their farming methods and increase their productivity.
3. The need for well-trained agricultural extension personnel is recognized by the Ministry of Agriculture. This is indicated by the establishment of short in-service training courses at the University of Ghana for extension officers, standardization of curriculum of the three agricultural training colleges in the country and the appointment of a committee to look into and recommend improvements that can be made in the standardized curriculum of the agricultural training colleges.

Objectives of the Study

The objectives of the study were:

1. To obtain opinions of Agricultural Extension Officers on whether Technical Officers being prepared for extension work need training in the identified competency areas.
2. To obtain Agricultural Extension Officers reaction on the degree of importance of each of the competency areas in the training programs, the degree of competence possessed in competency areas by

Technical Officers already engaged in extension work and where the competency was acquired.

3. To obtain the opinion of Senior Technical Officers (Supervisors of Technical Officers) on:
   a. The degree of importance of each of the identified competency areas in the training program of Technical Officers.
   b. The degree of competence possessed by technical officers under their supervision.
   c. The need for the training of technical officers in the identified competency areas; and
   d. Where the technical officers should acquire the competencies.
4. To obtain the opinions of Faculty members of the Agricultural Training Colleges on:
   a. The degree of importance of each of the competency areas in the training program of technical officers.
   b. The need for the training of technical officers in the competency areas; and
   c. Where the technical officers should acquire the competencies.
5. To develop recommendations relating to professional pre-service training needs based upon the findings of this study.

Hypotheses

The following hypotheses were tested in the study:

I. Within Population Hypotheses

A. The College Population

1. There is no difference between college groups in mean response for any of the nine competency areas in:

a. the perceived need for training in each competency area

b. when training should occur in each competency area

c. the perceived importance of each competency area.

B. The Technical Officer Population

1. There is no difference between Technical Officer college groups in mean response for any of the nine competency areas in:

a. the perceived need for training in each competency area

b. the degree of competence possessed in each competency area

c. where training occurred in each competency area

d. the perceived importance of each competency area.

2. There is no difference between tenure groups in:

a. the perceived need for training in each competency area

b. the degree of competence possessed in each competency area

c. where training occurred in each competency area

d. the perceived importance of each competency area.

3. There is no difference between regions in:

a. the perceived need for training in each competency area

b. the degree of competence possessed in each competency area

c. where training occurred in each competency area

d. the perceived importance of each competency area.

II. Between Population Hypotheses

A. There is no difference between the three populations (faculty of Agricultural Colleges, Senior Technical Officers and Technical Officers) in:

1. the perceived need for training in each competency area

2. the degree of competence possessed in each competency area (two populations--

Technical Officers and Senior Technical Officers)

3. where training should occur in each competency area (the three populations)
4. the perceived importance of each competency area (the three populations).

Assumptions

This study was based on the assumptions that:

1. Agricultural extension officers in Ghana could be made more effective by sound pre-service training in technical subject matter, extension service organization and administration, human development, educational process, social systems, program planning and development, communication, effective thinking, and in research and evaluation techniques.
2. Practicing agricultural extension officers, their supervisors and faculty of the agricultural training colleges in Ghana are capable of providing useful information on pre-service professional development needs of agricultural extension officers in Ghana.
3. Data collected in this study on the pre-service professional development needs of extension officers could be used as a basis for constructing

training programs or courses in the Agricultural Training Colleges in Ghana.

Limitations

This study was limited to an attempt to identify the pre-service training needs essential to effective performance of agricultural technical officers engaged in extension work in Ghana. The focus of the study was on those competency areas considered to be essential for successful entry into extension work. The study did not attempt to evaluate the present training programs in the Agricultural Training Colleges in Ghana and did not attempt to evaluate the present government policies. The study was limited to descriptions of the policies of the Ghana Government as regards to agricultural development, roles of the agricultural extension service, pre-service training programs of Agricultural Training Colleges and competency areas identified by agricultural extension officers, extension supervisors and faculty of agricultural training colleges as being important to be included in pre-service training programs.

Definition of Terms

1. Agricultural Extension Officer (Technical Officer): refers to one who has responsibility for agricultural extension programs or projects in a sub-district or part of a district in Ghana. Technical officers are

products of agricultural training colleges. They form the grassroots extension staff. They work directly with the farmer and are of special interest in this study.

2. Extension Supervisor: refers to one who has responsibility for agricultural extension programs or projects in an administrative district in Ghana. The term covers Senior Technical officers and agricultural officers. Senior Technical officers are usually holders of diplomas in agriculture from universities. Senior Technical officers supervise the technical officers who conduct extension programs and projects with farmers and their families. In this study the term supervisor refers specifically to senior technical officers.

3. Professional Training Needs: refers to lack of knowledge, skill, and attitudes in an extension officer which prevents him from satisfactorily performing his job or interferes with the full development of his full potential in preparing for greater responsibility.

4. Pre-Service Training: refers to the training and experience provided prior to appointment as an extension officer; the purpose of the training is to assist the individual in becoming as proficient as possible prior to employment.

5. Agricultural Training Colleges: refers to institutions administered and controlled by the Training and Manpower Division of the Ministry of Agriculture and

are responsible for the intermediate level training to provide the large number of technical officers required in all aspects of agriculture, including the extension services.

6. Competency Area: refers to the functions in the role of agricultural extension officer as specified in this study. An example of a competency area is the function of "program planning."

7. Competency: refers to the behavioral characteristics of knowledge, skills, attitudes, and judgement generally required for the successful performance of a task specified in this study. "How to involve 'lay' people in program development" is an example of a competency in the general competency area of program planning.

8. Tenure: refers to the length of service of agricultural extension officers in the Ghana Agricultural Extension Service.

9. Primary School: refers to a school usually including the first six grades but included grades seven to ten in pre-independent Ghana.

10. Primary School Leaving Certificate: refers to a certificate awarded to a pupil who passed primary grade ten examination in pre-independent Ghana.

11. Secondary School: refers to a school intermediate between elementary school and college or university.

A secondary school usually offers general, technical, vocational or college/university preparatory courses.

12. Secondary School Certificate: refers to a certificate awarded by the West African Examinations Council to a candidate who passes the secondary school leaving certificate examination.

13. General Certificate of Education (G.C.E.): refers to certificate awarded to a candidate on a subject basis at Ordinary, Advanced and Special levels. The examinations are organized by eight examination boards in Britain.

14. City and Guilds: refers to the certificate awarded by City and Guilds of London Institute to candidates of technical institutes, colleges or schools who pass the Institute's technical examinations.

CHAPTER II

REVIEW OF LITERATURE

This chapter describes the National Agricultural Policies of Ghana as they affect Agricultural Manpower training, the Agricultural Training Colleges in Ghana, and their Entry Requirements, gives a summary of the research studies and literature related to the identification of professional pre-service training needs of Agricultural Extension Officers in Ghana. Many of the Extension research studies on training needs were reviewed and only relevant aspects were included in this report.

Various books, committee reports and government documents related to the topic under investigation were reviewed and relevant information gathered were included.

National Agricultural Policies

Like many developing countries agriculture in Ghana is expected to do many things.

> Agriculture is expected to supply the food and raw materials of agricultural origin need to keep pace with an increasing population and per capita demand. Agriculture is expected as efficiency improves, to release blocks of workers for industrial and other nonfarm employment. Agriculture is expected to supply substantial amount of foreign exchange and domestic revenue or capital for financing necessary governmental activities, servicing of foreign debt, and

> actual nonfarm investment. Agriculture is expected to supply a growing market for the manufacturing and service industries both in terms of an increased per capita purchases of consumer goods among farm people. Finally, agriculture is increasingly expected to be sufficiently productive to supply food and the natural raw materials at prices which will assist in controlling inflation.[17]

In order for agriculture to satisfy these demands, it is important for the government to have a national agricultural policy to guide the farming population in achieving these expectations. Such a policy should necessarily make provision for the training of agricultural extension personnel who are responsible for the education of farmers. In other words, the government should have a sound agricultural extension manpower development and training policy.

The haphazard organization of the extension service discussed earlier in this chapter might have been due to a lack of well defined agricultural education policy. On Agricultural policy (which should include education and training) in Ghana, Professor La Anyane observed that the Ministry of Agriculture had no written statement of its policy since the one put out by its colonial predecessor in 1950/51. "The Ministry has groped in the dark in muddled confusion without any prolonged leadership of a Minister or Commissioner and under the inevitable

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[17] La Anyane, S., "Issues in Agricultural Policy," Background to Agricultural Policy in Ghana. Proceedings of a Seminar organized by the Faculty of Agriculture, University of Ghana. Legon 1969, p. 8.

misguided control of administrators with no professional knowledge."[18]

Part of what La Anyane said some seven years ago is still true today--the constant and too frequent change of Ministers/Commissioners of Agriculture and reorganization of the Ministry still continues. Mettrick observed that

> It has been a tendency among Ghananians in the past, perhaps particularly at top political/administrative level, to assume that, if only right administrative structure could be found, agricultural development would occur. Consequently there has been almost continuous change in administrative structure since Independence. What is required now is a period of stability in which individuals can become effective.[19]

It seems Mettrick's useful suggestion was not accepted, as continuous change in the administrative structure of the Ministry is still the order of the day.

Agricultural education plays an important role in agricultural development, it should therefore be given a prominent place in the national agricultural policy. La Anyane noted that the country had been engaged in agricultural research and training for nearly a century yet no outstanding improvement appeared in farmers farming methods and practices. Two reasons given for this were

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[18]La Anyane, S., op. cit., p. 22.

[19]Mettrick, H., Policies and Institutions in Ghananian Agriculture. First Report of the University of Reading/University of Ghana Legon Joint Research Project in Village Development, South East Ghana Development Study No. 9, 1971, p. 103.

that: (1) It was likely that only a few of the researches and training schemes yielded results which could make any significant impact on the farmers, and (2) a mass of research results was available but agricultural extension officers were not successful in introducing them through extension programs to the farmers.[20] La Anyane further observed that both research and training had lagged behind the needs of the country's agriculture, because we had not built upon the past, but had instead opened up, in almost every decade, entirely new areas of research unrelated to past work and endeavour and current needs. He suggested that research and training would have to be closely related to the needs of the country.[21] Education and training of technicians or middle-grade men to support the work of the professional men in research and extension was of vital importance. The agricultural structure of the country would be infinitely strengthened if its mid-section was strengthened, namely technician grades. La Anyane suggested that

> Research and training must inextricably become a part of the overall programs for economic development of this country. They must aim to provide food of the right nutritive quality that will feed the population adequately and leave behind a surplus foreign exchange earning export. They must also make possible

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[21] La Anyane, S., op. cit., p. 18.

> an abundance of agricultural raw materials required to supply the many factories which are being established.[22]

It is obvious that if agriculture is to have a well directed and effective training policy, the manpower requirements over a long period of time must be determined. Mettrick observed that this should have been the case but

> Unfortunately, there has been so much change in the industry over the last few years and the uncertainties are still so great that it has not proved feasible to prepare a manpower plan. Divisions prepare short-run projections of their manpower requirements, but these are only of two years duration shorter than some of the training courses.[23]

The present government of the Supreme Military Council came to power on January 13, 1972, and introduced an economic policy of Self Reliance and an agricultural policy "Operation Feed Yourself" in which farmers were asked to produce more to feed the country and for export and nonfarmers to make backyard gardens to supplement the efforts of the farmers.

In the Guideline for the Five-Year Development Plan, 1975-1980, published in Accra on 9th of January, 1975, General I. K. Acheampong, Head of State, and Chairman of the Supreme Military Council stated under the General Plan Policies that "Given the present structure

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[22]La Anyane, S., op. cit., p. 18.

[23]Mettrick, H., op. cit., p. 52.

of and constraints in the economy, in order to attain sustained growth, top priority, will be given to those programmes and projects that will make minimum demand on the balance of payments and significant contribution to our foreign exchange earnings."[24] Projects and programs to be undertaken would be those that would:

(1) Increase the export of the country--those that would minimize the constraining effect of the balance of payments.

(2) Promote the greatest linkage between agricultural and industry--agro-based industry that would derive inputs from the agricultural sector and manufacturing products that would supply the necessary backstopping services like fertilizers and other inputs for the agricultural sector thereby minimizing the import of requirements of those sectors.

(3) Require low capital inputs and preferably labour intensive--wherever they were economically and technically feasible.[25]

The Supreme Military Council hoped that through the mobilization of farmers, existing and contemplated industrial establishments, financial institutions, the cooperatives, educational institutions, public and private

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[24]Republic of Ghana, Guidelines for the Five-Year Development Plan 1975-80, January 1975, Accra, Ghana.

[25]Republic of Ghana, Guidelines, op. cit., p. 4.

institutions, backyard garden projects of individuals in the Government's Agricultural Policy of "Operation Feed Yourself," the following national goals would be achieved.

(1) Production of enough food to feed the population;

(2) Production of enough raw materials for existing and contemplated agro-based industries; and

(3) The diversification and increase in the sources of earnings of foreign exchange.[26]

The Guidelines did not specifically mention the training of agricultural extension personnel but a strategy for the Development of Manpower Resources in general was dealt with. The government recognized that rapid "skill" formation is a pre-condition and prerequisite of economic growth. There was therefore the need to spell out clearly the long-term aims and instruments for development of manpower resources. Three broad guidelines for manpower development were listed. These were:

(1) Identification of areas seriously handicapped, owing to shortages of strategic manpower.

(2) Initiation of measures for development and training of strategic manpower; and

(3) Formulation of policies and instruments for rational and efficient utilization of manpower resources.[27]

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[26]Republic of Ghana, Guidelines, op. cit., p. 13.

[27]Republic of Ghana, Guidelines, op. cit., p. 34.

In order to implement the manpower development strategy the following major steps were to be taken:

(1) Systematic and scientific assessment of current and future manpower requirements and resources of development planning, and identification of training needs.
(2) Establishment of an order of priority for drawing up, and development of various training programmes, on phased basis.
(3) Determination of the role of different types of training programmes, viz. apprenticeship training, on-the-job training, up-grading training, accelerated training, etc.
(4) Need for training and retraining of employed manpower.
(5) Adoption of progressive policy of Ghanianization in all important fields to achieve complete "Self-reliance."
(6) Adoption of appropriate salary and wage policy to ensure the supply of the requisite manpower with skills needed for rapid economic development.
(7) Specific incentives and facilities to employing establishments to organize and conduct their own training programmes.
(8) Rationalization of existing staffing pyramid which shows a higher ratio of professional to technicians and lower ratio of technicians to craftsmen.
(9) Improvement of the qualitative aspects of vocational and technical training programmes, and
(10) Need to broaden the scope, coverage, and contents of the existing training programmes.[28]

The foregoing evidence clearly shows that there was for a long period of time no written agricultural policy in Ghana. It is however quite evident now, that there is a trend toward the formulation of a sound agricultural policy as shown by Supreme Military Council's Five-Year Development Plan. Additional attention needs to be given to the area of agricultural personnel (especially technical staff)

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[28]Republic of Ghana, Guidelines for the Five-Year Development Plan, 1975-80, January, 1975, Accra, Ghana.

training to insure that the national extension programmes are effectively carried out.

Agricultural Colleges in Ghana

Agricultural Education below University level of training in Ghana, is the responsibility of the Division of Manpower and Training under the General Agriculture Department of the Ministry of Agriculture. This Division is headed by one of the Deputy Directors of Agriculture.

The functions of the Division as approved by Cabinet in 1964 are:

1. To collect all data and manpower requirements of the various branches of the Ministry as well as allied fields for use in the Ministry.
2. To give a full guidance to the work of all the educational institutions that are under the Ministry of Agriculture, and to liaise with the Universities in matters effecting the education and training of agriculturists and with the Ministry of Education in deciding the agricultural content of educational institutions under its administration.
3. To establish and organize pre-service and in-service courses designed to meet essential needs of various professional, and technical officers, farmers and farm workers.

4. To distribute graduates from educational institutions to agricultural organizations.[29]

The Manpower and Training Division now runs three Agricultural Training Colleges located at Kwadaso in the Ashanti Region, Nyankpala in the Northern Region and Ohawu in the Volta Region. (See page 37 for Map of Ghana showing the location of the colleges.) It also runs six Farm Institutes located at Ejura in the Ashanti Region, Adidome in the Volta Region, Wenchi in the Brong Ahafo Region, Asuansi in the Central Region, Damongo in the Northern Region and Navrongo in the Upper Region.

Kwadaso Agricultural College

This is the oldest Agricultural Training School of the Ministry of Agriculture. It was first established in 1922 at Sunyani in the Brong Ahafo Region to train youths for an agricultural life and to give a regular supply of trained junior staff for the Forestry Department and the Department of Agriculture.

In 1932 the school moved into Cadbury Hall, a building in Kumasi put up by Messrs Cadbury and Fry Limited--a cocoa buying and manufacturing company. The Training centre was closed in 1940 due to the outbreak of the Second World War and was re-opened at Cadbury Hall in October 1946 after the

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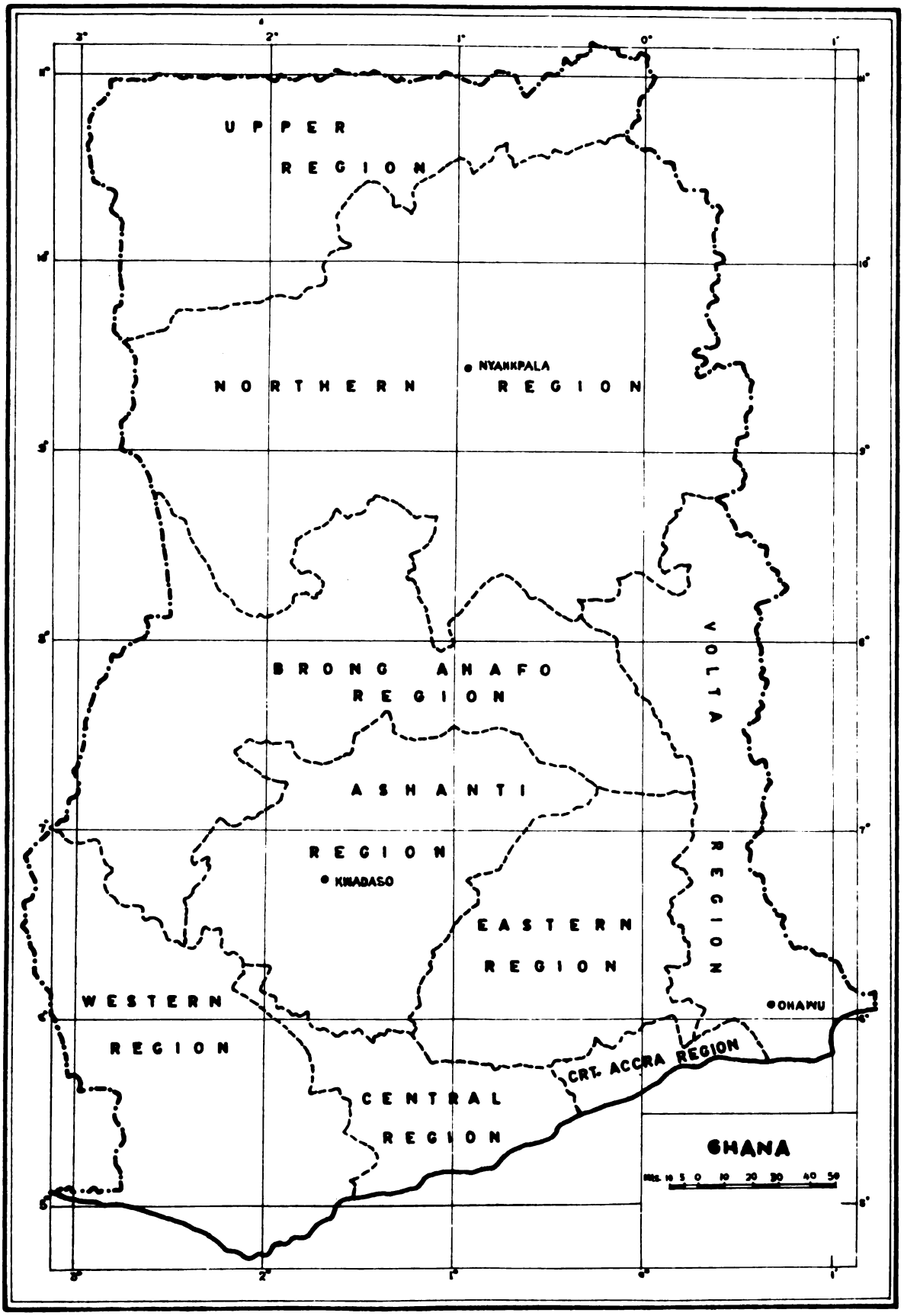
[29]Ministry of Agriculture Training and Manpower Division, Ministry of Agriculture Training Schools for Staff, Workers and Farmers, Accra, Ghana, 1965, p. 7.



AGRICULTURAL TRAINING COLLEGES •

war to train staff for the Department of Agriculture. The Forestry Department by then had opened its own training school in Synyani.

Due to extensions to the residential areas and the building of sawmills near and around Cadbury Hall, it became impossible for the school to expand to meet the growing demands for trained personnel for the Department of Agriculture. A new Training centre was therefore planned and built at Kwadaso six miles southwest of Kumasi. The new college was officially opened in December 1952. It is a three year college and now admits about a hundred students a year.

Nyankpala Agricultural College

This school started in 1915 by the Department of Agriculture for boys who passed the Primary School Leaving Certificate to enable them to enter the Department of Agriculture in the Northern Territories as Improvers. The training was entirely practical. Recruits for the school were later on from 1928 to 1936 sent to Cadbury Hall, Kumasi for training. Graduates from the school were appointed by the Department of Agriculture as Junior Assistant Overseers.

The recruitment and appointment of agricultural staff was taken over by the Native Authorities in their various areas in 1938, but the Department of Agriculture remained responsible for the training of agricultural personnel. Courses were also held at Tamale and Zuarungu

Agricultural Stations. The courses held at these stations were also practical in scope with very little theoretical training. The standard of entry was lowered and boys with as little as three years primary education were accepted for training. "Although some excellent Native Authority Agricultural Instructors were trained by this system, it became clear that sooner or later special training staff would have to be allocated to training alone and that when this happened, Primary School Leaving Certificate should be the minimum entry standard."[30]

After the Second World War the Tamale Training Centre was opened and training on the other agricultural stations ceased. Due to the policy of siting Agricultural Training Centres on major agricultural stations, the Training Centre was moved from Tamale to new buildings on the Central Agricultural Station at Nyankpala in 1953.

Between 1953 and 1964 a Three-Year Agricultural Instructors' Course was run and those who qualified from this course and worked in the field for a period of four to ten years, were sent back to the centre for a year promotion course to qualify as Agricultural Assistants. The Centre was renamed "Nyankpala Agricultural College" in 1968. The objectives of the college as stated in the College Information Booklet are as follows:

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[30]Ministry of Agriculture Training and Manpower Division, Nyankpala Agricultural College, Information, 1969.

The college stands for improving the lot of the peasant farmer. The aim is achieved through:

(a) Training the type of person who will be in a position to help the farmer to produce more.
(b) Training a cadre of agricultural technicians who can provide the essential link between scientific research and the operatives in the field--all grades of farmers.
(c) Preparing technicians for the various production wings of the Ministry of Agriculture and other agricultural agencies.
(d) Offering adult farmer courses direct to the farmers.[31]

Ohawu Agricultural College

The School was one of the mechanization training centres established in the country under joint Technical Aid Agreements between the Governments of Ghana and the United States of America to train staff in all aspects of the use of farm machinery, as a pre-requisite for a large scale mechanized food production drive in the country.

The school produced operators of tractors and other farm machinery, workshop personnel for repair duties, in-service training for all grades (both Senior and Junior agricultural staff) and short courses for adult farmers in various aspects of crop husbandry.

Under the United States of America and the Ghana Government Technical Aid Agreements which established the training centre, the Ghana Government provided the buildings, and Ghananian staff, and the United States Government provided almost all the equipment plus three advisors in

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[31] Ibid.

the fields of farm mechanics, farm shopwork and farm management. The advisory staff helped to manage the centre until trained Ghananians took over.

The school was raised to the college status in 1968. It owes its present position in the Agricultural Training College Program to the recognition of the need in the Ministry of Agriculture for the substantial numbers of staff who not only know how to maintain the operate, but also understand the incorporation of mechanization into agricultural practices. The school accommodates 100 students. In its Guidelines to Planning, the Training and Manpower Division has this to say about the Ohawu Agricultural College.

> The School is making a transition from its former role of training young people as farmers for the Workers Brigade, Young Farmers' League, the Farm Settlement, etc. to that of supplying the Ministry with Technical Officers well trained and equipped in the field of Agricultural Mechanization. Our experience so far is that, it appears the Ministry has not got the capacity to employ all the graduates from Ohawu and use them effectively. Mechanization Division for instance, prefers to employ straight Artisans and Mechanics to such graduates. On the other hand, those who have gone to Divisions like Animal Husbandry at Amrahia where a lot of highly sophisticated agricultural equipment is utilized have received recommendation. Because of the present limited use of these graduates, it is recommended that the recruitment be based on the City and Guilds Intermediate level certificate, G.C.E. "O" level and Departmental Employees who have had a one-year pre-entry work in Nyankpala.[32]

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[32]Ministry of Agriculture Training and Manpower Division, Guidelines to Planning, 1971, p. 5.

It was also recommended that students who showed interest in mechanization during their two-year study in the three colleges would have their third year at Ohawu.

Entry Requirements to Agricultural Colleges

Since the establishment of the Agricultural Training Centres, conditions have changed in the country's agricultural policies and these have affected the set-up in the centres. The entry requirements differed from centre to centre. At Kwadaso Agricultural Training College, the entry requirement which had hitherto been the Primary School Leaving or Standard Seven Leaving Certificate or three Years' Secondary School education had to give way to the London Matriculation or the Cambridge School Certificate. School Certificate failures were sometimes admitted under certain conditions. At Nyankpala Training Centre boys who passed the Primary School Leaving Certificate examination were admitted. This requirement was later on lowered and boys with three years primary school education were admitted.

The Ohawu Training Centre had as its entry requirement candidates with the Primary School Leaving Certificate. The requirement was later on changed to those candidates with City and Guilds Certificates because the school was to lay emphasis on farm mechanization instead of general agriculture. The problem of standardizing entry requirements for the three colleges was discussed in 1972

Manpower Division of the Ministry of Agriculture stated the problem as follows:

> At present the entry requirements for the three colleges vary significantly. Kwadaso admits only school certificate and G.C.E. holders. Ohawu has been retraining Departmental Employees for upgrading to the Technical Officer cadre. Departmental Employees who come to Nyankpala Agricultural College for upgrading are, in the main, people who have not had a secondary school education. This makes it difficult, if not impossible, to mix them with Secondary School leavers who have had about five years of Science Subjects.[33]

The committee of the Training and Manpower Division suggested a solution to the problem and recommended that

> Since a standardized curriculum is sought for the three colleges, departmental employees who wish to enter any of the colleges for upgrading must necessarily attend a one-year course in basic sciences comprising Chemistry, Biology, Physics, Mathematics, and English Language, as a pre-entry requirement for the two-year residential programme. It is further recommended that admission to the one-year preparatory course which should be organized at the Kwadaso Agricultural College--should be by competitive examination; and that all Departmental employees of the sub-technical cadre with a minimum of five year superior service will, upon recommendation of their Heads of Department/Division qualify to participate in the examinations.[34]

The problem of mixing School Certificate, City Guilds and Departmental Employee Candidates in the Colleges was also discussed. Ohawu Agricultural College was the only college accepting City and Guilds Candidates. This

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[33]Ministry of Agriculture--Training and Manpower Division, Proposed Standardized/Harmonized Curriculum for Certificate Level Training in Agricultural Colleges Conducted by the Training and Manpower Division--Ministry of Agriculture, 1972, p. 3.

[34]Ibid., p. 3.

was found to be due to the fact that Ohawu was meant to specialize in Farm Mechanization and to train in routine shopwork and tractor maintenance, and repair operations. It was observed that since there seemed to be no clear-cut policy and/or scheme of service for the graduates of the Ohawu programme, it could be concluded that institution of this training ran contrary to the activities of the Mechanization and Transport Division which was supposed to utilize the skills of the graduates from the Ohawu Agricultural College. To solve the problem, the Committee had this to say:

> It has been observed that the background of the City and Guilds candidates in Agriculture at the time of entry is often more detailed than the average G.C.E. (General Certificate of Education) candidate. It is the opinion of the committee that in standardizing the curricular, this differentiation in the two-year residential programme is unjustifiable. It is, therefore, recommended that Departmental employees who had passed the one-year basic Science course, and holders of G.C.E. and City and Guilds (Agricultural Engineers) Certificates should be accepted in all the Agricultural Colleges for training that, based on student interest preference, those who wish to specialize in Farm Mechanization can do their Third Year field training at Ohawu Agricultural College. Similarly, students who are desirous of specializing in Animal Husbandry practices may be sent to the Nyankpala Agricultural College for the Third Year in lieu of the Field Experience Programme.[35]

The committee's recommendations were accepted by the Ministry of Agriculture, Training and Manpower Division and with effect from 1973, the Entry Requirement for all the three Agricultural Colleges became one of the following:

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[35]Ibid., p. 4.

(a) General Certificate of Education (Ordinary Level) with at least passes in English Language, Elementary Mathematics, General Science of Agricultural Science.

(b) West African School Certificate with passes in English Language, Elementary Mathematics, General Science or Agricultural Science.

(c) Intermediate City and Guilds Certificate with emphasis in Agricultural Engineering (Mechanics).

(d) Departmental Employees with a minimum of five years satisfactory service, and who pass competitive examination organized by the Training and Manpower Division.

The Departmental employees will be required to undergo a year's Basic Science Course at Kwadaso Agricultural College. For advertisement for candidates see Appendix A.

Pre-Service Training Programs of Agricultural Colleges

The course at all the three Agricultural Training Colleges in Ghana are of three years duration. Students spend the first two years in residence. The third year training which is aimed at acquainting the students with practical experience and the duties of a Technical Officer is spent in the field with various divisions under the Ministry of Agriculture. Departmental employees who already possess practical field experience spend all the

three years in residence. The first in the Basic Sciences, and the last two years are spent in one of the colleges taking the actual First and Second Year Courses.

The Third year practical experience program has come under criticism in recent times. Watkins and Mends observed that

> The Third year of practical training consisted in many cases of sending the trainee to his post in the field to learn while engaged in carrying on the job, and without the supervision he needs to remedy his mistakes. The result was that the Third year of learning provided little practical training for the student in such cases.[36]

The curriculum standardization and evaluation Committee of Agricultural Colleges found that the Third Year Learners who were posted to various stations and organizations to undergo the Third year practical experience training were often neglected. As many of the students have never worked in the field until they entered college, the committee recommended that "In view of the discontinuance of the pre-entry field experience programme, and as a means of affording the students an opportunity to appreciate real agricultural problems, the Chief Agricultural Training

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[36]Watkins, M. O., and Mends, Horatio, Manpower and Training, Ministry of Agriculture, Ghana, A Study of the Organization, Manpower Development and Training of the Ministry of Agriculture, 1973, p. 86.

Officer should seriously explore the possibilities of re-introducing the second year sandwich course."[37]

Review of Past Training Programs

Until 1973, the three Agricultural Training Colleges were using different syllabuses--they differed in content and in scope. It should be noted, however, that Nyankpala Agricultural College Course followed closely that of Kwadaso Agricultural College but all details that would not be understood by the post elementary school candidate were eliminated. The curriculum was about forty percent practical and sixty percent theoretical.

Ohawu Agricultural College offered courses in General Agriculture with emphasis on Mechanization; four months supervisory course for Farm Managers and others in charge of large scale farms and four monthly courses for Agricultural mechanics and fitters.

A summary of the Kwadaso Agricultural College Syllabus (until 1973) for the two residential years was as follows:

First Year

1. Crop Production including Agricultural Botany
2. Soil Science
3. Crop Protection

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[37]Ministry of Agriculture, Ghana, The curriculum Standardization Committee, Agricultural Colleges--Training and Manpower Division, 1972, p. 5.

4. Animal Production
5. Agricultural Economics
6. Farm Mechanization
7. Field Experimentation
8. Surveying
9. Meteorology.

Second Year

1. Crop Production
2. Soil Science
3. Crop Protection
4. Animal Production
5. Applied Agricultural Economics and Farm Management
6. Agricultural Mechanization
7. Field Experimentation
8. Surveying
9. Extension Education

Extension Education was offered only in the Second Year and the following areas were listed under the general heading Extension Education:

1. Extension philosophy, objects and principles.
2. Social problems likely to confront extension workers.
3. Reaching and influencing farmers
   (a) Establishing human relations
   (b) Getting the desired change, on farmers own terms and at their own pace.
   (c) Inculcating the idea of self help.

4. Executing Programs
   (a) Encouraging villagers to cooperate and participate willingly and fully in all phases of the implementation of farming programs.
   (b) The part played by the extension worker in the whole process.
   (c) Exhaustive use of local resources, both human and material.
5. Training in Extension Teaching Methods
   (a) steps in teaching.
   (b) Methods in teaching--individual, group, and mass media approaches.
   (c) Use of visual aids.
   (d) Identifying, training and using local Chief farmers.
6. Code of conduct of village extension workers.
7. Convincing farmers to adopt improved agricultural methods.[38]

Review of Present Training Programs

In 1972 a report prepared by a committee of the Training and Manpower Division of the Ministry recommended a unified curricula for the three Agricultural Training

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[38]Training and Manpower Division, Ministry of Agriculture, Ministry of Agriculture Training Schools for Staff, Workers and Farmers, Accra, Ghana, 1965, pp. 19-40.

Colleges in the country. The rationale behind the decision was stated as follows:

> On assumption of office in February 1972, the present Chief Agricultural Training Officer realized that although Ghana has had significant experience with agricultural education and training at the nondegree level, the trend of national affairs ascribed new demands to be fulfilled. Since contemporary Ghana is undergoing important adjustment in its basic political, social and economic environment, the time is ripe for both short-range and concurrent initiatives to produce changes that could have lasting effect on the long term development of the Technical personnel of the Ministry and of the whole country. This, it is believed, can best be achieved through a local-based unified curricula of the three staff training colleges of the Division.[39]

The committee observed that the approach in the past had been one of proliferating the levels, types and kinds of education and training in response to specific training needs. It became obvious that Ghana could not afford to continue such proliferation. The time has come when a more conscious and conscientious effort must be made to integrate the institutional and curriculum components of the three agricultural colleges into a system which:

(1) Provides for greater flexibility in response to changing demands for different levels and kinds of skills;

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[39]Ministry of Agriculture, Ghana, The curriculum standardization committee, Agricultural Colleges--Training and Manpower Division, 1972, p. 1.

(2) Facilitates mobility of trained manpower especially with regard to improving the ability to transfer agricultural skills from one job to another; and

(3) Establishes a continuity of purpose that enables graduates of all the agricultural colleges to advance in their training up to the University level within limits of their aspirations and abilities; and as compatible with requirements for trained manpower at various levels of agricultural skills development as possible.

The recommendation for a unified curriculum was accepted and each college was to be encouraged to review curriculum trends in adjusting contents to environmental conditions, local needs and interdisciplinary approach and related subjects.

The curriculum standardization committee's report presented in 1972, was accepted and with effect from 1973, the three colleges started using a unified syllabus. In the new syllabus, objectives, related student activities were clearly stated. This was an improvement on the old syllabus.

A summary of the standardized and harmonized syllabus for the two residential years is found in Appendix B.

Review of Research Studies

Agricultural extension plays a very important role in agricultural and rural development of a country. The abilities of farmers and the decisions they make about their farming operations are crucial to the rate of agricultural development. Programs designed to facilitate farmer education are an important phase of education for agricultural development. Such programs might have the following characteristics: "Farmer education based on the principles of going to farmers where they are; farmers present interest and needs; respecting the fact that farmers are adults; unit of instruction for teaching and learning being new or changed practice; opportunities for farmers to try out new methods taught; technically sound and economically profitable new or changed practice and encouragement to experiment is 'extension education.'"[40] Part of the function of extension education is to make farmers aware of alternatives--the difficult methods for carrying on their farming operations. For extension to do this successfully, extension officers should know of these alternatives.

Extension's role in agriculture is to get mass acceptance of improved agricultural methods. This results

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[40]Mosher, A. T., Getting Agriculture Moving: Essentials for Development and Modernization. Published for the Agricultural Development Council.

in increased production with improved standards of living. Extension, therefore, helps in:

(1) Increasing yields for unit of land and livestock.

(2) Increasing farmer's income, resulting in improved standard of living of rural population.

(3) Increasing the amount of exportable agricultural products, thus generating much needed foreign exchange.

(4) Increasing savings and providing public revenue which could stimulate general economic development of the country; and

(5) Contributing to national socio-economic development by providing enlightened and progressive rural population.

Studies done in some of the African countries tend to show that one of the major factors responsible for the slow development in agriculture is the ineffectiveness and inefficiency of the agricultural extension services in these countries. Brown, in his study of the Adoption of Improved Agricultural Practices in the Atebubu and Lawra Districts of Ghana, stated that "The extension service in Ghana has not lived up to expectation which was generally held for it."[41] Brown went on to say that "They have not

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[41]Brown, C. K., "Adoption of Improved Agricultural Practices in the Atebubu and Lawra Districts of Ghana," Ghana Journal of Sociology, Vol. 8, No. 1, July 1974.

only failed to pass on information to the farmers about the introduction of a new crop or seed, but they have also failed to fulfill their role of giving advice on everyday problems which the farmers might encounter in their daily activities on the farm."[42] It is true that one cannot teach what one does not know. What are the causes of the failures stated by Brown? Is the pre-service training providing the necessary competencies needed by the extension officers? In a paper presented at a Workshop on Agricultural Extension in Ujaman Village Development in Tanzania, Freyhold observed that the possibility of the agricultural advisor (extension officer) meeting the demands of helping farmers to increase their agricultural production through the use of modern techniques and tools depended among other factors the adequacy of the extension service's organization and the adequacy of the extension officer's own training for the task given him. He further observed that

> The organization of the advisory service is inadequate--the concepts, organization, philosophy, programming, function, and methods of extension are generally not understood by the entire extension organization, or if they are, are not implemented. Even worse for the advisory service is the fact that the advisor is generally of low technical competence and does not have enough research materials to work with.[43]

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[42] Ibid.

[43] Freyhold, Von K., The Role of Agricultural Extension in Ujaman Village Development. Papers and Proceedings of a Workshop on Agricultural Extension in Ujaman Village Development, Morogoro, Tanzania, 22-27 September 1975.

Freyhold noted that extension officers during their training learn what he called "blanket recommendations" which they did not learn to experiment within the context of local peasants' experience in order to convert them to recommendations applicable to the specific ecological condition of their work place. He ended his observation by pointing to the advisors lack of accountability, contrary class interests, nonidentification with peasant aspirations, poor training, and even lack of adequate knowledge.

On personnel training and staff development in Agricultural Extension, Maunder quoted Paul Leagans as saying at a National Extension Seminar held in Khartoum, Sudan, April 1974, that Economic and Social growth among village people--in any nation depends on the ability to build an adequate staff properly trained professional people to manage the rural development enterprise. Maunder himself observed that shortage of adequately trained personnel limits the effectiveness of extension services in many countries.

> The nature of extension education, like any profession, calls for special knowledge, skills, understanding and attitudes. Knowledge of technical subject matter in agriculture and home economics; practical skill in applying technology on farming and living, skill in teaching farmers and villagers; an understanding of the human relationships in society in which teaching is carried on, of the people, their customs, values and attitudes toward change; and a

> belief in the ability of rural people to develop and carry out programs for their own benefits.[44]

The important part pre-service training plays in making it possible for agricultural extension officers to acquire these skills for their future effective performance in the field cannot be overemphasized. Obibuaku points out that "the ability of an extension worker to guide farmers from awareness to sustained adoption of farm practices is dependent on his training and experience in agriculture and extension methods."[45] If this is true, are the Ghananian Agricultural Extension Officers taken through training programs and other related experiences that adequately prepare them for their extension jobs? In their report Watkins and Mends mentioned the inadequate training for extension work as reflected in the need for more technical knowledge and ability in the use of extension methods and techniques. The reporters noted a concern expressed by the Assistant Directors of Agriculture that the extension officers lacked the skill and knowledge of how to carry out the program planning process with the farmers. To correct this, Watkins and Mends suggested "in-service training for

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[44]Maunder, A. H., Agricultural Extension. A Reference Manual. Human Resources and Institution Division, F.A.O., Rome, p. 219.

[45]Obibuaku, L. O., Education and Training in the Nigerian Agricultural Extension Service. Journal of Administration Overseas, Vol. XIV, No. 2, April 1975, p. 114, H.M.S.O., London.

the existing extension officers and better preparation at the Training Colleges for those being trained."[46]

It is the considered opinion of some writers that extension officers in many developing countries are poorly trained. Obibuaku observed that

> The predominance of poorly-trained extension staff probably arises from the mistaken notion that extension work is simple and anyone can do it, or perhaps from the misconception of extension work as the provision of services only. But if it is realized that the principal function of extension is education--the education of the farmer, then the need for proper staff training would be better appreciated.[47]

What should the curriculum of the agricultural extension officer training colleges contain in order to adequately prepare the students for effective extension work? Obibuaku suggests that "members of the extension staff are required to work under conditions in which a policy aimed at total rural transformation is brought into focus, must be adequately equipped not only with knowledge of general agriculture, but must have some knowledge also of sociology, psychology, rural organization, leadership qualities, village survey methods and human relations."[48]

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[46]Watkins and Mends, Manpower and Training, Ministry of Agriculture, Ghana, A Study of the Organization, Manpower Development and Training of the Ministry of Agriculture, 1973, p. 79.

[47]Obibuaku, L. O., op. cit., p. 114.

[48]Obibuaku, L. O., op. cit., p. 118.

Maunder feels that all extension workers require special knowledge or competence in a number of broad areas. While each employee has special training needs according to his own job requirements, knowledge and understanding is needed by all in the following areas.

Technical Subject Matter in agriculture and home economics is the chief commodity extension has to offer people. There is no substitute for sound technical training. As Paul Leagans says: "To undertake to teach what one does not know is to invite failure from the start."[49] An extension worker must have thorough basic knowledge of technical information appropriate to his job and must keep abreast of current material. To do this he must know reliable sources of information. Furthermore, he must understand how subject matter relates to problems of farming and living.

Extension Service Organization and Operation. Every extension worker needs to know the objectives of the service, understand its organization, be familiar with its policies and understand office management, business procedures, personnel responsibilities and qualifications at all levels.

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[49]Leagans, Paul J., "Criteria for an Effective National Policy for Training an Extension Staff," a paper presented at Khartoum, Sudan, April 1964, to participants in the National Extension Seminar.

Human Development. He requires understanding of human development processes, behavior patterns, group dynamics, group interactions, and skills in human relations. His success depends to a large extent upon the relationship he develops and maintains wi-h farmers and villagers, local leaders, his colleagues in the extension service, and with officials of other agencies and services.

Program Development. Developing, executing and evaluating educational programs in cooperation with local people is the basic function of field extension workers. All extension personnel must understand the processes involved in order to make their respective contributions.

The Educational Process involves the principles of learning, the learning process, how to motivate people and the methods and techniques of teaching.

Social System. To work effectively with his people, an extension worker needs to understand basic social organization including reference groups (family, church, community, power structures, how to identify local culture, social, economic, etc.) how to identify and develop leaders, group and social action processes.

Communication. The ability to communicate effectively can be developed and improved. It involves speaking, writing, counseling, demonstrating and the use of group and mass methods.

Research and Evaluation. Extension personnel need to be able to measure the effectiveness of programs and the methods used, to understand the experimental approach and to assist people in evaluating their own efforts.[50]

Research studies and committee reports have identified training needs of agricultural extension agents in the United States of America. It is interesting to note the similarity in the recommendations of the committee reports and the research findings on extension agent training needs.

In 1948, a joint committee representing the United States Department of Agriculture and the Association of Land Grant Colleges made the following recommendations: "Formal education for extension workers should be such as to develop rigorous critical thinking and balance of action. Broad programs of study without undue specialization are best adapted to attaining these needs."[51] As to the program content of pre-service education for extension agents, the joint committee suggested:

1. That the first emphasis be placed on technical courses in agriculture and home economics.

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[50]Maunder, A. H., Agricultural Extension. A Reference Manual, Human Resources and Institution Division, F.A.O., Rome, pp. 209-220.

[51]The Subcommittee on Pre-Service Training of the Land Grant College Committee on Pre-Service and Graduate Training for Extension Workers. An Undergraduate for Extension Work: A Planning Guide, 1954.

2. That courses in Chemistry, Biology, Physics, Economics, Sociology, Education, Psychology, and the Humanities be included.
3. That the curriculum contain courses in communications.
4. That the Social Sciences should also be included.
5. That it would be well to provide courses in extension education methods; and
6. That laboratory experience in the field, under the direction of resident extension personnel, has the possibilities of becoming an important educational procedure.

The United States Senate Committee on Pre-Service and Graduate Training for Extension Workers held the view that the Undergraduate training should be broad and flexible but suggested the following core of courses, with approximate percentage of the curriculum which they should occupy, as a general guide for curriculum development or for counseling with students interested in studying for extension work:

1. Basic work in the major fields of subject matter agriculture and home economics--35 percent;
2. Basic work in the Natural Sciences--Biological and Physical such as Chemistry, Botany, Bacteriology, Physics and Mathematics--20 percent;

3. Basic work in the Humanities such as English, Literature, History, Philosophy, Art, Music, and Communication--15 percent;
4. Basic work in Social Sciences such as Education, Economics, Psychology, Sociology, Political Science and Anthropology--10 percent;
5. Basic work for professional preparation such as extension education, extension methods, and laboratory courses in country agent work, Sociology and Communication--10 percent;
6. Elective--10 percent.[52]

The Extension Organization and Policy Committee's Subcommittee on the Training of Extension Personnel also suggested an undergraduate pre-service training program. There is no vast difference between its recommendations and those of the joint committee and the Senate Committee. The Extension Organization and Policy Subcommittee suggested (without allocating percentage of the curriculum they should occupy) that the training program should include:

1. Basic work in major fields of subject matter in agriculture and home economics;

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[52]The Senate Committee on Pre-Service and Graduate Training for Extension Workers. Undergraduate Training for Prospective Extension Workers (Washington, D.C.: Extension Service, U.S.D.A.).

2. Basic work in the Natural Sciences such as Chemistry, Botany, Biology, and Physics;
3. Basic work in Social Sciences such as History, Economics, Sociology, etc.;
4. Tool subjects as public speaking, use of radio, discussion and conference methods, parliamentary procedure, etc.;
5. Training in rural education or forces affecting rural life.[53]

In a "Planning Guide," the Land Grant Subcommittee on Pre-Service and Graduate Training for Extension Workers made specific recommendations for undergraduate training in four subject matter areas. These are:

1. The Natural Sciences and technical subject matter that colleges provide for prospective extension workers.
   (a) A core of courses which introduces the student to the basic natural sciences and to the major phases of agricultural and home economics.
   (b) Additional work beyond the core in one or two areas of subject matter, with considerable proficiency in one area.

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[53]Subcommittee on the Training of Extension Personnel of the Extension Organization and Policy Committee, 1948 Report (Washington, D.C.: Extension Service, U.S.D.A.).

(c) Some work in agricultural policy, in farm management, in agricultural economics or marketing could well be included in the preparation for home economic agents to contribute to their perspective of the total problem of rural families. Likewise, some work in home economics, such as family life, nutrition, or home management, could well be included in the preparation of agricultural agents so that they would develop a greater understanding and appreciation of the problems involved in satisfying home and family living.

2. Social Sciences: The Subcommittee developed a list of desirable outcomes to be gained through social science study. For balanced study within the Social Sciences the prospective extension worker should gain:

(a) An understanding of the basic beliefs in the American way of life, philosophy of our form of government and of education.

(b) An understanding of world history, interdependence of the different peoples of the world and the individual responsibility for fostering international understanding and peace.

(c) An understanding of American community life, cultural mores, developmental processes in stimulating leadership.

(d) An understanding of the educational processes--how people learn.

(e) An understanding of the psychological and social basis of human relations--how individuals and groups behave as they do; the development tasks of youth, the skills needed in working with people.

(f) A knowledge of and skill with human relationships, and a belief in the educational process.

(g) An understanding of the economic forces as they affect a public policy.

(h) An ability to understand and analyze the essentials of an economic or social problem and to appreciate its implications in relation to the life and work of a technologist.

(i) An interest and active participation in community activities as an informed and responsible citizen helping to solve the social, economic and political problems of one's community, state and nation.

(j) An understanding of the farm and home as an operating unit.

(k) Skills in the use of advisory and interviewing techniques.

(l) A familiarity with reliable sources of important information about rural people, economic conditions and major forces affecting rural life and of the interdependence of rural and urban people.

(m) A knowledge of community services in health, welfare and education and how to use them.

3. The Humanities--the subcommittee beliefed that the study in the Humanities should help to develop:

(a) An appreciation of cultural interests lying outside the fields of science and technology.

(b) Ability to participate to some extent in some form of creative activity, etc.

4. Communications--Steps in the specific areas of communications should help to develop:

(a) An understanding of the philosophy of communication.

(b) Skills in the means of communication, including listening, reading, writing, speaking and demonstrating.

(c) Ability in analytical thinking, interpreting information and in solving problems.

(d) Appreciation of the responsibility for accuracy in communications; judgement in selecting sources of information.

(e) Recognition of communication resources within a community, the possibilities of each, and knowledge of how to use each.

(f) Ability to process information and get it ready for communication.[54]

McCormick in his study on the Analysis of Training Needs of County Extension Agents in Ohio,[55] mentioned nine areas in which extension agents needed competence. The nine areas were identified by a National Task Force on In-Service Training. The areas were:

1. Understanding Social Systems
   - A. Leadership--Identification and Development.
   - B. Group Processes and Social Action (decision-making).
2. Program Development
   - A. Determination of Problem Identification.
   - B. Teaching Methods, Plan of Work, Management of Time and Energy.
   - C. Evaluation.

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[54] An Undergraduate Education Program for Extension Work, op. cit.

[55] McCormick, R. W., An Analysis of Training Needs of County Extension Agents in Ohio. Ph.D. Dissertation, 1959, University of Wisconsin.

3. Understanding Human Development
   A. Human Relations.
   B. Counseling.
4. Organization and Administration of Extension
   A. Extension Organization and Policy.
   B. Office Management.
   C. Recruitment and Selection of Personnel.
5. The Educational Process
   A. Principles of Learning.
   B. Teaching-Learning Process.
   C. Educational Philosophy.
   D. Adult Education Programs.
6. Communication
   A. Public Relations.
   B. Professional Contribution.
7. Effective Thinking
   A. Critical Thinking.
   B. Creative Thinking.
8. Research and Evaluation
   A. Interpretation.
   B. Action Research.
9. Technical Knowledge

The list of competencies identified by the National Task Force is almost identical to that developed by Leagans. Leagans identified the following areas of professional abilities needed by extension agents.

1. Understanding the change process.
2. Knowledge of technology.
3. Planning for change.
4. Clarifying objectives and goals.
5. Understanding the relationship between theory and application.
6. Providing learning experiences and learning situations.
7. Skill in organizing people.
8. Skill in counseling and guidance.
9. Ability to effectively executive the teaching--Communication process.[56]

In a summary of nine Extension studies on factors that should be considered in planning pre-service and in-service training programs in Extension carried out in 1953 by Frutchesy for the Office of Naval Research, Department of Navy, nine factors were identified that should be considered in training. They were:

1. additional work in the Social Science area.
2. Continued effort in agricultural subject matter.
3. Organization of people.
4. Formulating, clarifying, and stating objectives.

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[56]Leagans, Paul J., Professional Abilities Needed by Extension Personnel to Meet Challenges in the Decade Ahead. Paper presented to the Illinois Extension Staff at its Annual State Conference, Urbana, University of Illinois, October 1965.

5. Program Planning procedure.
6. Organization and administration of personnel.
7. Communication.
8. Understanding people and human behavior.
9. Human relations.[57]

The type of training given to agricultural extension officers is important because the success of agricultural projects depends on the skills and effectiveness of the extension officers put in charge of the projects. It is unfortunate that agricultural extension training programs have been less than satisfactory--this is due to the fact that training programs are not based upon an adequate analysis of what kind of training is really demanded or required by the trainees.

Williams observed that "the most complex problem facing administrators responsible for the training of extension workers is to identify the basic subject matter fields necessary for effective extension work."[58] It is the opinion of Williams that "training programs are sometimes established without sufficient analysis and

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[57]Frutchesy, Fred P., Differential Characteristics of the Most Effective and Less Effective Teachers. A summary report of nine studies made for the Office of Naval Research, Department of the Navy (Washington: Federal Extension Service, 1953).

[58]Williams, S. K. Taiwo, Training Agricultural Extension Officers, Extension, Food and Agriculture Organization of the United Nations, Rome, 1970, p. 4.

planning."[59] The need for determining training needs in a more formalized way cannot be ignored if training programs are to be effective.

According to Williams agricultural extension officer training should cover these basic areas:

1. Understanding of technical subjects related to agriculture;
2. Theory and principles of the teaching-learning process--methods of effectively reaching people with information and of motivating them to use it;
3. Study of customs, values and attitudes of the people concerned;
4. Understanding of research techniques, the habit of searching for basic facts;
5. Principles and methods of administration and supervision. In addition to the five areas, Williams suggested four other areas which in his opinion, are necessary if a good professional training program is to be developed.
6. Understanding of the history, administrative procedure and policies of the extension organization to which the officers are attached; knowledge of the various agencies and services supporting the extension programs;

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[59]Williams, S. K. Taiwo, op. cit., p. 4.

7. Awareness of national plans for development of extension work;
8. Encouragement of extension officers to plan programs, organize and evaluate, and to use more sophisticated means of communication, as in communicating the results of research for example;
9. Help for individual officers at whatever level to advance professionally.[60]

Several methods have been used by researchers in identifying or determining training needs of workers. McGee and Thayer identified three methods that can be effectively used in determining training needs.

1. Organization analysis. This determines where within the organization training emphasis should be placed. It focuses on the study of the entire organization, its objectives, its resources and their allocation.
2. Operations analysis. This determines the contents of training in terms of what an employee must do to perform a job effectively. The focus is on the task, not the man.
3. Man analysis. This emphasizes the individual employee, determining the skills, knowledge and

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[60]Williams, S. K. Taiwo, op. cit., pp. 4-5.

attitudes which he must develop if he is to perform his work.[61]

The three methods are very closely related and a combination of the three was used in this study to identify the training needs of agricultural extension officers in Ghana.

Summary

A good deal of work had been done over the years in the United States of America, Canada, Nigeria and Tanzania to identify training needs of agricultural extension officers. The studies identified training areas of (1) extension organization and administration, (2) human development, (3) educational process; (4) social systems, (5) program planning and development, (6) communication, (7) effective thinking, (8) technical subject matter, and (9) research and evaluation as areas agricultural extension officers should have training in if they were to be effective change agents. It is evident from the literature review that pre-service training programs for agricultural extension officers in agriculturally developed countries like the United States and Canada contained the nine identified training areas. The Ghananian pre-service training program on the other hand had only four of the nine areas--extension organization and administration, social systems, educational process and

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[61]McGee, William, and Thayer, Paul, Training in Business and Industry (New York: John Wiley and Sons, 1961.

program planning and development. Did the absence of the remaining five areas in the training program a factor relating to the poor job performance of the Ghananian agricultural extension officer as indicated in the literature review?

Serious efforts were being made by the government of Ghana to help the small-scale farmers (who are responsible for the production of food for the nation) to improve their farming methods. This was being done through agricultural improvement programs and projects. It was the view of the writer that the programs and projects would be successful if only they were manned by qualified and well trained agricultural extension officers.

The literature review pointed out that the agricultural extension officer training programs in Ghana are not effective and that a study should be done to identify training needs of the Ghananian agricultural extension officers. The findings of the study might be used in improving the pre-service and in-service training programs for the agricultural extension officers.

CHAPTER III

METHODOLOGY

Development of Questionnaire

A survey instrument was decided to be the most logical method of collecting the data. Questionnaires used in studies done to determine training needs of extension agents by McCormick,[62] Price,[63] and Bouchard[64] were used as a basis for producing a usable instrument for this study.

The following nine competency areas were used in the questionnaire:

1. Extension Organization and Administration.
2. Human Development: developmental processes of people, group interaction principles, etc.

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[62]McCormick, R. W., "An Analysis of Training Needs of Country Agents in Ohio." Ph.D. Dissertation, University of Wisconsin, 1959.

[63]Price, R. K., "An Analysis of Educational Needs of Arkansas Extension Agents." Ph.D. Dissertation, University of Wisconsin, Madison, 1959.

[64]Bouchard, A. J., "Training Needs of County Agricultural Extension Agents in Quebec, Canada." Ph.D. Dissertation, Ohio State University, 1966.

3. The Educational Process: principles of learning, teaching methods, philosophy of education, etc.
4. Social Systems: family, community, school, church groups, special interest groups, farmer organizations, etc.
5. Program Planning and Development.
6. Communication: basic communication, individual, group and mass media, etc.
7. Effective Thinking: problem solving method, decision making based on critical analysis, etc.
8. Technical Knowledge: Subject matter in agriculture.
9. Research and Evaluation: principles of research and evaluation, methods of utilizing research findings, etc.

Items in the competency areas were constructed to fit Ghananian terminology.

Three questionnaires containing identical items, but soliciting different responses, from the three respondent groups were used. See Appendices C, D and E for samples of questionnaires. Three reactions were required from Technical Officers and Senior Technical Officers on each of the nine competency areas. These reactions are identified here as sections of the questionnaire.

Section I.--Technical Officers and Senior Technical Officers were asked to indicate whether in their opinion

competency in the items were Needed or Not Needed by beginning technical officers employed as agricultural extension officers in the Ministry of Agriculture.

Section II.--Technical Officers were asked to indicate the degree of competence they (technical officers) possessed in the items on a 1 to 5 scale--"1" representing a low degree of competence and "5" a high degree of competence possessed. Senior technical officers were asked to indicate using the same scale, the degree of competence possessed by technical officers (engaged in extension duties) working under them (senior technical officers). See Appendix C for Technical Officers Questionnaire.

Section III.--Technical Officers were asked to indicate when the competencies were acquired--"Before College," "In College," or "After College." Senior Technical Officers on the other hand were asked to indicate when in their opinion technical officers should acquire the competencies, "Before College," "In College," or "After College." See Appendix D for Senior Technical Officers Questionnaire.

The Faculty of Agricultural Colleges had the nine competency areas divided into two sections.

Section I.--Faculty Members were asked to indicate whether in their opinion beginning technical officers

engaged in extension work--Needed or Not Needed competency in the nine areas.

Section II.--Faculty Members were asked to indicate when in their opinion competency in the areas should be acquired--"Before College," "In College," or "After College."

All the respondents--Technical Officers, Senior Technical Officers, and Faculty Members were asked to check the nine competency areas based on their feelings as to whether the areas are Very Important, Important or Not Important to be included in the pre-service training program for extension officers. See Appendix E for Faculty Members Questionnaire.

Respondents

The target population of this study about which generalizations are made was made up of the following:

(1) A sample from Agricultural Extension Officers (technical officers) stratified by Regions and by years of service (tenure). The two stratifications were proportionately sampled.
(2) A random sample of 55.5 percent of the total population of Senior Technical Officers in the eight regions covered, and
(3) All the Faculty of the three agricultural colleges in Ghana.

Respondents in the study were therefore limited to technical officers, senior technical officers, and faculty of agricultural colleges. Thirty technical officer respondents randomly selected from each of the eight regions were made up as follows: ten with tenure between 2-5 years; ten with tenure between 6-9 years and ten with tenure of 10 years and above. The total Technical Officer respondents was 240 out of a population of 480 (see Table 1).

Forty-eight senior technical officers were randomly selected and interviewed out of a population of eighty-four. The total population of 24 faculty members of the three agricultural colleges were included in the study.

In all 312 respondents were interviewed out of a population of 588. Table 2 shows the distribution of Potential Population and the Actual Population included in this study.

Pre-Test of the Questionnaire

The questionnaire was pre-tested on thirty technical officers admitted to the University of Ghana in October 1975 to take a two-year National Diploma in Agriculture Course. Prior to their admission, these technical officers worked in the field as agricultural extension officers for not less than three years. Since these students have practical field experience in extension work, the writer felt that it was possible to obtain an adequate pre-test which would

Table 1.--Technical Officer Respondents by Region and Tenure.

Regions	Tenure			
	2-5 years	6-9 years	10 years & above	Total
Brong Ahafo	10	10	10	30
Eastern	10	10	10	30
Volta	10	10	10	30
Central	10	10	10	30
Western	10	10	10	30
Greater Accra	10	10	10	30
Ashanti	10	10	10	30
Northern	10	10	10	30
Total	80	80	80	240

Table 2.--Potential Population and Actual Population of Respondents.

Position	Potential Population	Actual Population	Percentage of Potential Population
Technical Officers	480	240	50
Senior Technical Officers	84	48	55.5
Faculty Agricultural Colleges	24	24	100
Total	588	312	53

provide an estimate of reliability and validity of the questionnaire.

Based upon the result of the pre-test some items in the technical subject matter area were rephrased.

Reliability of Questionnaire from Sample Data

Item Homogeneity Reliability was used to determine to what extent the items in the scale measure the same underlying construct for the set of respondents. Hoyt's Analysis of Variance method was used to estimate the reliability of the measuring instrument. The formula used was:

$$\text{Reliability} = \frac{\text{MS subjects} - \text{MS subject x Item}}{\text{MS subjects}}$$

In the above formula MS denotes Mean Squares of subjects. The reliability of items is affected by (1) the nature of the items (do they refer to the same construct), (2) the number of items (the more the items the better), and (3) the number of subjects (the more the subjects the better).[65] Table 3 shows the reliability coefficient of items used in the research questionnaire.

In testing the reliability we found that certain items were constant among the subjects studied. Because item homogeneity statistics will not calculate in the

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[65]Hoyt, C. J., "Test Reliability Estimated by Analysis of Variance," Psychometrika, 1941, 6, 153-160.

Table 3.--Reliability of Questionnaire from Sample Data.

Question Types --	College Population N = 24		Technical Officer Population N = 235			Senior Technical Officer Population N = 48		
	Need for Training	When Should Training be Given	Need for Training	Competence Possessed by Technical Officers	When is Received	Need for Training	Competence Possessed by Technical Officers	When Should Training be Given
Competency Area								
Extension Organization and Administration No. of Items = 8	.86 (7)	.65 (8)	.88 (8)	.87 (8)	.76 (8)	.08 (3)	.93 (8)	.79 (8)
Human Development No. of Items = 10	.94 (9)	174 (10)	.90 (10)	.92 (10)	.86 (10)	.66 (7)	.95 (10)	.90 (10)
Educational Process No. of Items = 10	.94 (9)	.36 (10)	.91 (10)	.93 (10)	.83 (10)	.70 (7)	.96 (10)	.83 (10)
Social Systems No. of Items = 10	.87 (7)	.85 (10)	.77 (10)	.91 (10)	.86 (10)	.90 (8)	.96 (10)	.89 (10)
Program Planning and Development No. of Items = 12	.98 (12)	.90 (12)	.92 (12)	.95 (12)	.92 (12)	.91 (9)	.98 (12)	.88 (12)
Communication No. of Items = 10	.95 (10)	.75 (9)	.72 (10)	.93 (10)	.84 (10)	.53 (7)	.97 (10)	.85 (10)
Effective Thinking No. of Items = 9	.94 (9)	.84 (9)	.74 (9)	.92 (9)	.85 (9)	.89 (9)	.95 (9)	.83 (9)
Technical Knowledge No. of Items = 39	.96 (30)	.92 (38)	.96 (39)	.97 (39)	.94 (39)	.85 (29)	.78 (34)	.82 (29)
Research No. of Items = 10	.96 (10)	.80 (10)	.64 (10)	.94 (10)	.86 (10)	.89 (10)	.70 (9)	.70 (9)
Importance of Competency Area No. of Items = 9		.59 (9)			.58 (9)			.77 (5)

present of constant variables, all such items were eliminated in order to calculate item homogeneity. Table 4 shows the list of variables eliminated.

In general the coefficients of reliability shown in Table 4 seemed quite satisfactory when the limited number of items and subjects in each scale (especially in the faculty of Agricultural Colleges and Senior Technical Officer populations) is considered.

Collection of Data

Data for this study were collected in Ghana by the writer from January 2 to May 18, 1976. Soon after the writer arrived in Ghana, he held a meeting with the Director of Agriculture, Ministry of Agriculture to brief him on the study.

An official letter was sent to the Commissioner for Agriculture asking for permission to interview technical officers, senior technical officers, and faculty of the three agricultural colleges under the Ministry of Agriculture. Permission was granted and letters were sent from the Director of Agriculture to all the nine regional agricultural officers and the Officers-in-Charge of the three agricultural colleges asking them to give the writer all the assistance he might need with regard to his study (see Appendix F). Data collection was started in the first week of January, 1976.

Table 4.--Reliability of Questionnaire Variables Eliminated.

Population	Question Type	Competency Area	Items Eliminated
Faculty of Agricultural Colleges	Need for training	Extension Organization and Administration	6
		Human Development	8
		Educational Process	6
		Social Systems	5, 7, 9
		Technical Knowledge	2, 4, 6, 7, 13, 20, 31, 37, 38
	When training should be given	Communication	5
		Technical Knowledge	34
Senior Technical Officers	Need for training	Extension Organization and Administration	1, 2, 3, 5, 6
		Human Development	2, 5, 9
		Educational Process	2, 5, 8
		Social Systems	1, 3
		Program Planning and Development	2, 3, 5

Table 4.--Continued.

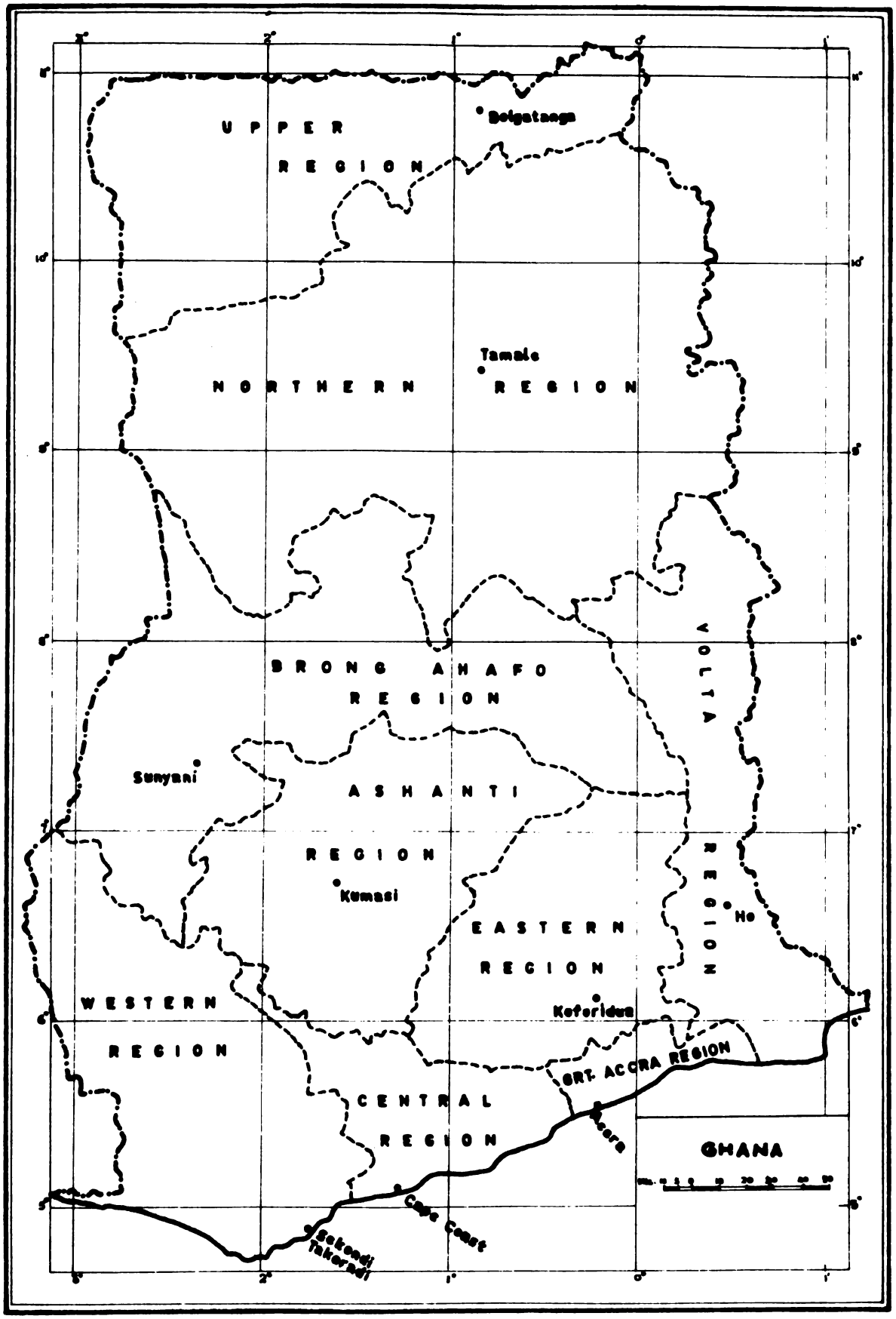
Population	Question Type	Competency Area	Items Eliminated
		Communication	5, 7, 8
		Technical Knowledge	4, 27, 28, 31, 32, 34, 35, 36, 37, 39
	Competency possessed by technical officers	Technical Knowledge	4, 8, 11, 29, 36
		Research	4
	When training should be given	Technical Knowledge	4, 5, 6, 8, 10, 11, 16, 19, 23, 24
		Research	4
	Importance of competency areas		1, 2, 5, 8

The writer visited eight out of the nine regions with two research assistants and administered the questionnaires. Respondents completed the questionnaires after the purpose of the study and the items under the nine competency areas were explained and their cooperation sought. Respondents were only requested to check the appropriate column indicating their response.

The study was designed to cover all the nine regions of Ghana (see map on page 86 showing the nine regions) but due to official governmental activities involving technical officers and senior technical officers in the Upper Region during the period of data collection, the Upper Region was not covered by the survey. This will not have any adverse effect on the findings of this study because the Northern Region which shares a common boundary and runs the same agricultural extension programs with the Upper Region was included in the study. It should be noted that the two regions also share common farming conditions, methods, and farm practices. It is the opinion of the writer that there would be no significant difference between officers in the Northern and Upper Regions in their reactions to items in the questionnaire.

Analysis of Data

Data collected were coded and key-punched onto computer cards and analyzed utilizing the CDC 6500 computer at the Michigan State University.



REGIONS OF GHANA

Each content area subtest for each major scale was scored by adding the values for each item response of times defined as falling within the subtest. Reliability of each subtest was computed. The hypotheses for differences between groups within populations and between populations were tested with one-way analysis of variance. Tukey post hoc procedures were employed to isolate pairwise differences wherever the omnibus F Ratio was significant at alpha = .05.

CHAPTER IV

FINDINGS OF THE STUDY

This chapter deals with the analysis of data in the order of the hypothesis contained in Chapter I. Each hypothesis is restated to facilitate reader understanding of the analysis of the data. The chosen alpha level for each hypothesis test was 0.05.

Results of Each Hypothesis Test

Null Hypothesis I

There is no difference between college groups within college population in mean response for any of the nine competency areas in:

1. the perceived need for training for technical officers in each competency area,
2. when training of technical officers should occur in each competency area, and
3. the perceived importance of each competency area in the training program for technical officers.

An analysis of variance was conducted to test the difference between the three agricultural colleges, (1) Kwadaso, (2) Nyankpala, and (3) Ohawu, within the

college population for each of the nine competency areas by three question types (need for training, when training should occur and the importance of the competency areas). In no case was the null hypothesis rejected. The probability of the differences between the three colleges arising by chance for the 27 tests conducted ranged from .105 to .754 with a mean of .417 and a standard deviation of .18. A summary of the analysis of variance results is presented in Tables 5, 6, and 7. Observation of the per item score in the table revealed that faculty of the three agricultural colleges--Kwadaso, Nyankpala and Ohawu indicated that beginning technical officers employed as extension officers need training in the nine competency areas and that the training should take place in the agricultural colleges. On the importance of the areas to be included in the training program, the faculty of Kwadaso and Ohawu Colleges indicated that the areas of extension organization and administration, human development, educational process, and social systems were very important; faculty of Nyankpala College found the areas to be important. The areas of program planning and development and communication were found to be very important by faculty of Ohawu and important by faculty of both Kwadaso and Nyankpala Colleges. Nyankpala and Ohawu Colleges found the area of effective thinking very important while faculty of Kwadaso College found the area important. The areas of technical knowledge

Table 5.--Analysis of Variance for Faculty of College Groups with Respect to the Need for Training in the Nine Competency Areas.

	1. Kwadaso Agricultural College $\bar{x}$			2. Nyankpala Agricultural College $\bar{x}$			3. Ohawu Agricultural College $\bar{x}$			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD						1	2	3
Extension Organization and Administration	7.00	.87	2.31	7.62	.95	.52	7.50	.94	.84	.98	2.54	2,21	.38	.685			
Human Development	8.70	.87	2.26	9.62	.962	.52	10.00	1.00	.00	3.68	2.28	2,21	1.61	.224			
Educational Process	9.30	.93	1.88	9.62	.96	.74	8.16	.82	4.02	3.90	5.56	2,21	.56	.579			
Social Systems	9.20	.92	1.93	9.75	.97	.71	9.83	.98	.41	1.01	1.81	2,21	.56	.579			
Program Planning and Development	11.00	.91	2.83	10.62	.88	3.89	12.00	1.00	.00	3.37	8.47	2,21	.39	.676			
Communication	9.00	.90	2.16	8.62	.86	3.50	10.00	1.00	.00	3.37	6.08	2,21	.55	.583			
Effective Thinking	7.20	.80	3.05	8.75	.97	.71	9.00	1.00	.00	8.12	4.15	2,21	1.96	.166			
Technical Knowledge	36.60	.94	4.09	35.62	.91	7.99	38.67	.99	.55	16.17	28.55	2,21	.57	.576			
Research and Evaluation	8.70	.87	2.87	8.50	.85	3.46	9.83	.98	.41	3.45	7.57	2,21	.46	.640			

Scale: 0 - Not Needed
1 - Needed

Table 6.--Analysis of Variance for Faculty of College Groups with Respect to When Training Should be Given in the Nine Competency Areas.

	1. Kwadaso Agricultural College			2. Nyankpala Agricultural College			3. Ohawu Agricultural College			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	$\bar{X}$ Raw Score	$\bar{X}$ Per Item Score	SD	$\bar{X}$ Raw Score	$\bar{X}$ Per Item Score	SD	$\bar{X}$ Raw Score	$\bar{X}$ Per Item Score	SD						1	2	3
Extension Organization and Administration	16.90	2.11	1.20	17.25	2.15	2.19	16.17	2.02	.41	2.05	2.24	2,21	.91	.417			
Human Development	21.40	2.14	1.58	20.37	2.04	3.25	19.83	1.98	1.33	5.11	5.00	2,21	1.02	.377			
Educational Process	20.00	2.00	1.05	20.62	2.06	1.30	20.00	2.00	.00	1.04	1.04	2,21	1.00	.385			
Social Systems	22.00	2.20	3.50	23.37	2.33	4.10	21.67	2.17	1.86	6.21	11.68	2,21	.532	.595			
Program Planning and Development	27.20	2.27	3.55	28.37	2.36	4.81	25.83	21.32	3.60	11.09	16.20	2,21	.685	.515			
Communication	21.30	2.13	1.49	21.75	2.17	3.06	20.83	2.08	2.04	1.45	5.07	2,21	.286	.754			
Effective Thinking	19.50	2.17	2.17	20.37	2.26	3.42	18.17	2.02	.41	8.37	5.96	2,21	1.405	.268			
Technical Knowledge	81.60	2.09	4.43	76.25	1.95	7.22	79.67	2.04	4.08	64.05	29.77	2,21	2.15	.141			
Research and Evaluation	21.50	2.15	1.71	22.37	2.24	3.16	20.50	2.05	1.22	6.04	4.95	2,21	1.22	.315			

Scale: 1 - Before College
2 - In College
3 - After College

Table 7.--Analysis of Variance for Faculty of College Groups with Respect to the Importance of the Nine Competency Areas.

Competency Areas (Content Areas)	Group 1 Kwadaso Agricultural College $\bar{X}$	Group 1 Kwadaso Agricultural College S	Group 2 Nyankpala Agricultural College $\bar{X}$	Group 2 Nyankpala Agricultural College S	Group 3 Ohawu Agricultural College $\bar{X}$	Group 3 Ohawu Agricultural College S	MS Between	MS Within	df	F	P	Subsets 1	Subsets 2
Extension Organization and Administration	1.60	.699	1.12	.354	1.67	.52	.675	.315	2,21	2.145	.142		
Human Development	1.60	.516	1.25	.463	1.67	.52	.83	.249	2,21	1.54	.238		
Educational Process	1.40	.516	1.25	.354	1.67	.41	.196	.196	2,21	1.00	.384		
Social Systems	1.50	.527	1.25	.463	1.00	.00	.479	.191	2,21	2.52	.105		
Program Planning and Development	1.20	.422	1.12	.354	1.00	.00	.075	.118	2,21	.636	.539		
Communication	1.10	.316	1.25	.463	1.00	.00	.112	.114	2,21	.984	.390		
Effective Thinking	1.30	.675	1.50	.534	1.00	.00	.429	.290	2,21	1.48	.251		
Technical Knowledge	1.50	.850	1.25	.463	1.00	.00	.479	.381	2,21	1.26	.305		
Research	1.80	.789	1.50	.756	1.33	.516	.450	.521	2,21	.864	.436		

Scale: 0 - Not Important
1 - Important
2 - Very Important

and research and evaluation were found to be very important by the faculty of Kwadaso, Nyankpala and Ohawu Colleges.

Null Hypothesis II

There is no difference between college groups within the Technical Officer population in mean response for any of the nine competency areas in:

(a) the perceived need for training for technical officers in each competency area,

(b) the degree of competence possessed by technical officers in each competency area,

(c) when training of technical officers occurred in each competency area, and

(d) the perceived importance of each competency area in the training program for technical officers.

An analysis of variance was conducted testing for difference between the three agricultural colleges within the technical officer population for each of the nine competency areas by four question types: (1) need for training; (2) degree of competence possessed; (3) when training occurred; and (4) the perceived importance of the competency areas. A summary of the analysis of variance results of Hypothesis II is presented in Tables 8, 9, 10, and 11.

The question on the need for training in the human development competency area yielded an F of 4.51 which with a df = 2,225 was significant at $p < .05$. Tukey post hoc

Table 8.--Analysis of Variance for Technical Officer College Groups with Respect to the Need for Training in the Nine Competency Areas.

	1. Kwadaso Agricultural College $\bar{x}$			2. Nyankpala Agricultural College $\bar{x}$			3. Ohawu Agricultural College $\bar{x}$			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD						1	2	3
Extension Organization and Administration	7.50	.94	1.23	7.60	.95	.96	7.15	.89	1.72	2.41	1.63	2,225	1.47	.231			
Human Development	9.33	.93	1.36	8.51	.85	2.51	9.28	.93	1.58	13.69	3.04	2,225	4.51	.012*	2,3	3,1	
Educational Process	9.07	.91	2.16	9.13	.91	1.88	9.42	.94	1.79	1.99	4.11	2,225	.484	.617			
Social Systems	9.14	.91	1.92	9.20	.92	1.91	9.53	.95	1.03	2.57	3.19	2,225	.806	.448			
Program Planning and Development	11.25	.94	2.19	11.05	.92	2.40	11.42	.95	1.37	1.64	4.48	2,225	.367	.693			
Communication	9.46	.95	1.44	9.53	.95	1.41	9.56	.96	1.37	.19	2.01	2,225	.093	.911			
Effective Thinking	8.26	.92	1.46	8.29	.92	1.45	8.44	.94	1.10	.53	1.96	2,225	.271	.763			
Technical Knowledge	36.89	.94	4.18	37.38	.96	4.86	36.84	.94	4.85	5.33	20.10	2,225	.265	.767			
Research and Evaluation	9.58	.96	1.08	9.65	.96	1.42	9.86	.99	.413	1.23	1.19	2,225	1.035	.357			

Scale: 0 - Not Needed
1 - Needed

Table 9.--Analysis of Variance for Technical Officer College Groups with Respect to the Degree of Competence Possessed by Technical Officers in the Nine Competency Areas.

	1. Kwadaso Agricultural College $\bar{x}$			2. Nyankpala Agricultural College $\bar{x}$			3. Ohawu Agricultural College $\bar{x}$			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD						1	2	3
Extension Organization and Administration	26.53	3.32	6.39	24.89	3.11	5.53	25.79	3.22	7.53	53.08	41.34	2,225	1.28	.279			
Human Development	31.75	3.17	8.87	31.84	3.18	7.37	32.63	3.26	10.43	12.91	78.46	2,225	.165	.848			
Educational Process	33.61	3.36	8.78	32.20	3.22	8.53	34.63	3.46	10.12	74.40	80.81	2,225	.921	.400			
Social Systems	33.71	3.37	8.04	32.05	3.20	6.96	35.30	3.53	9.81	128.73	66.66	2,225	1.93	.147			
Program Planning and Development	40.01	3.33	10.74	39.27	3.27	9.66	42.65	3.55	10.76	153.33	110.12	2,225	1.39	.251			
Communication	34.10	3.41	9.31	34.91	3.49	8.11	36.14	3.61	8.88	69.70	80.27	2,225	.868	.421			
Effective Thinking	27.53	3.1	7.80	28.16	3.13	7.16	28.84	3.20	8.50	29.56	60.66	2,225	.487	.615			
Technical Knowledge	132.82	3.40	27.35	134.51	3.45	26.15	141.37	3.62	30.59	1184.80	767.66	2,225	1.54	.216			
Research and Evaluation	31.40	3.14	9.34	30.53	3.05	8.19	33.79	3.38	10.82	137.24	87.95	2,225	1.56	.212			

Scale: $\frac{1}{2}$ - Low Competence 3 - Average Competence $\frac{4}{5}$ - High Competence

Table 10.--Analysis of Variance for Technical Officer College Groups with Respect to When Training Should be Given in the Nine Competency Areas.

	1. Kwadaso Agricultural College			2. Nyankpala Agricultural College			3. Ohawu Agricultural College			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD						1	2	3
Extension Organization and Administration	18.90	2.36	2.55	18.64	2.33	2.30	18.35	2.29	2.95	5.24	6.63	2,225	.790	.455			
Human Development	23.07	2.31	4.56	22.36	2.24	4.47	22.35	2.23	4.68	14.17	20.81	2,225	.681	.507			
Educational Process	22.16	2.22	3.86	22.36	2.24	3.31	22.09	2.21	3.88	1.08	13.99	2,225	.077	.926			
Social Systems	25.04	2.50	4.01	24.64	2.46	3.37	24.70	2.47	4.36	3.98	15.51	2,225	.256	.774			
Program Planning and Development	29.75	2.48	4.86	30.14	2.51	4.07	30.12	2.51	4.77	4.18	21.76	2,225	.192	.825			
Communication	23.97	2.39	3.81	23.09	2.31	3.08	23.32	2.33	4.08	17.46	13.73	2,225	1.27	.282			
Effective Thinking	21.57	2.40	3.81	21.22	2.36	3.43	21.51	2.39	4.35	2.42	14.70	2,225	.165	.848			
Technical Knowledge	85.56	2.19	10.08	83.80	2.15	7.48	83.42	2.14	11.11	105.70	94.72	2,225	1.12	.329			
Research and Evaluation	23.41	2.34	3.20	22.60	2.26	2.81	23.23	2.32	3.37	12.91	9.91	2,225	1.30	.274			

Scale: 1 - Before College
2 - In College
3 - After College

Table 11.--Analysis of Variance for Technical Officer College Groups with Respect to the Importance of the Nine Competency Areas.

Competency Areas (Content Areas)	Group 1 Kwadaso Agricultural College $\bar{X}$	Group 1 Kwadaso Agricultural College S	Group 2 Nyankpala Agricultural College $\bar{X}$	Group 2 Nyankpala Agricultural College S	Group 3 Ohawu Agricultural College $\bar{X}$	Group 3 Ohawu Agricultural College S	MS Between	MS Within	df	F	P	Subsets 1	Subsets 2
Extension Organization and Administration	1.29	.49	1.24	.51	1.30	.51	.073	.248	2,225	.293	.746		
Human Development	1.55	.51	1.49	.63	1.56	.59	.073	.314	2,225	.233	.792		
Educational Process	1.23	.47	1.25	.52	1.16	.43	.109	.228	2,225	.478	.621		
Social Systems	1.55	.85	1.42	.59	1.39	.49	.538	.551	2,225	.978	.378		
Program Planning and Development	1.25	.53	1.11	.37	1.12	.39	.502	.222	2,225	2.262	.106		
Communication	1.25	.53	1.31	.54	1.23	.48	.084	.276	2,225	.304	.738		
Effective Thinking	1.45	.54	1.20	.45	1.25	.44	1.507	.254	2,225	5.928	.003*	2,3	3,1
Technical Knowledge	1.19	.39	1.16	.46	1.16	.37	.024	.167	2,225	.141	.868		
Research	1.48	1.08	1.25	.48	1.21	.41	1.664	.755	2,225	2.203	.113		

Scale: 0 - Not Important
1 - Important
2 - Very Important

comparisons were conducted to test pairwise differences revealing a significant difference between Kwadaso ($\bar{x}$ = 9.33) and Nyankpala ($\bar{x}$ = 8.51) agricultural colleges but no significant difference between either Kwadaso or Nyankpala and Ohawu ($\bar{x}$ = 9.28) agricultural colleges.

The question on the degree of importance of the effective thinking competency area yielded an F of 5.93 which with df = 2,225 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between Kwadaso ($\bar{x}$ = 1.45) and Nyankpala ($\bar{x}$ = 1.20) but no significant difference between either Kwadaso or Nyankpala and Ohawu ($\bar{x}$ = 1.25) agricultural colleges. In no other case was the null hypothesis rejected. The probability of the difference between the three colleges arising by chance for the 34 remaining tests conducted ranged from .147 to .926 with a mean of .522 and a standard deviation of .259.

With 36 tests conducted, two tests (36 by .05 = 1.8) are expected to achieve significance by chance. Given that only two tests achieved significance, their replicability is in question. The overwhelming weight of evidence (34 significant tests) suggest that in the overall sense, the null hypothesis of no difference between college groups in the technical officer population as to the need for training, when training should be given,

degree of competence possessed and the importance of the nine competency areas was not rejected.

Examination of per item scores in Tables 8, 9, 10, and 11 disclosed that Kwadaso, Nyankpala and Ohawu college groups within the technical officer population indicated that training in all the nine competency areas was needed and that such a training is important and should be given in the agricultural colleges. The respondents in the groups also indicated that their competence in the areas was average.

Null Hypothesis III

There is no difference between tenure groups within the technical officer population in mean response for any of the nine competency areas in:

(a) the perceived need for training for technical officers in each competency area,

(b) the degree of competency possessed by technical officers in each competency area,

(c) when training of technical officers occurred in each competency area, and

(d) the perceived importance of each competency area in the training program for technical officers.

An analysis of variance was conducted testing for difference between the three tenure groups: (1) 2-5 years; (2) 6-9 years; and (3) 10 years and above within the technical officer population for each of the nine

competency areas by four question types: (1) need for training; (2) degree of competence possessed; (3) when training occurred; and (4) importance of the competency areas. In no case was the null hypothesis rejected as far as the perceived need for training in the nine competency areas is concerned. The probability of the differences between tenure groups arising by chance for the nine tests conducted for the need for training in the nine competency areas ranged from .167 to .953. A summary of the analysis of variance on the need for training in the nine competency areas is presented in Table 12. Per item scores in the table indicates that all the three tenure groups--(1) 2-5 years; (2) 6-9 years; and (3) 10 years and above within the technical officer population saw the need for training in all the nine competency areas.

The question on the degree of competence possessed by technical officers in the extension organization and administration competency area yielded an F of 5.34 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 2-5 years ($\bar{x}$ = 25.26), 6-9 years ($\bar{x}$ = 24.78) and 10 years and above ($\bar{x}$ = 27.93) tenure groups but no significant difference between 6-9 years and 2-5 years tenure groups.

The question on the degree of competence possessed by technical officers in the human development competency

Table 12.--Analysis of Variance for Technical Officer Tenure Groups with Respect to the Need for Training in the Nine Competency Areas.

	1 (2-5 years) $\bar{x}$			2 (6-9 years) $\bar{x}$			3 (10 years & above) $\bar{x}$			MS	MS				Tukey Post Hoc Subsets		
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Between	Within	df	F	P	1	2	3
Extension Organization and Administration	7.30	.91	1.50	7.56	.94	1.13	7.52	.94	1.17	1.53	1.63	2,231	.937	.393			
Human Development	8.91	.89	2.04	9.26	.93	1.53	9.13	.91	1.77	2.53	3.23	2,231	.784	.458			
Educational Process	9.22	.92	1.93	9.05	.90	2.30	9.12	.91	1.87	.613	4.20	2,231	.146	.864			
Social Systems	9.26	.93	1.78	9.23	.92	1.88	9.17	.92	1.75	.156	3.26	2,231	.048	.953			
Program Planning and Development	11.21	.93	2.20	11.51	.96	1.53	10.93	.92	2.57	6.32	4.56	2,231	1.39	.252			
Communication	9.50	.95	1.43	9.68	.97	1.06	9.24	.92	1.80	3.81	2.11	2,231	1.80	.167			
Effective Thinking	8.20	.99	1.50	8.44	.94	1.13	8.28	.92	1.52	1.22	1.94	2,231	.63	.535			
Technical Knowledge	36.44	.93	5.85	37.33	.96	3.76	37.08	.95	4.10	16.81	21.85	2,231	.769	.465			
Research and Evaluation	9.64	.96	1.29	9.71	.97	.922	9.59	.96	1.07	.291	1.22	2,231	.237	.789			

Scale: 0 - Not Needed
1 - Needed

area yielded an F of 4.97 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 6-9 years ($\bar{x} = 30.09$) and 10 years and above ($\bar{x} = 34.41$) tenure groups, but no significant difference between either 6-9 years or 10 years and above and 2-5 years ($\bar{x} = 31.19$) tenure groups.

The question of the degree of competence possessed by technical officers in the educational process competency area yielded an F of 3.18 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 6-9 years ($\bar{x} = 31.99$) and 10 years and above ($\bar{x} = 35.53$) tenure groups, but no significant difference between either 6-9 years or 10 years and above and 2-5 years ($\bar{x} = 32.86$) tenure groups.

The question on the degree of competence possessed by technical officers in the social systems competency area yielded an F of 5.53 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 2-5 years ($\bar{x} = 31.92$), 6-9 years ($\bar{x} = 32.75$) and 10 years and above ($\bar{x} = 36.11$) tenure groups, but no significant difference between 2-5 years and 6-9 tenure groups.

The question on the degree of competence possessed by technical officers in the program planning and development competency area yielded an F of 4.67 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons were conducted to test pairwise differences revealing a significant difference between 2-5 years ($\bar{x} = 37.79$) and 10 years and above ($\bar{x} = 42.93$) tenure groups, but no significant difference between either 2-5 years or 10 years and above and 6-9 years ($\bar{x} = 40.07$) tenure groups.

The question on the degree of competence possessed by technical officers in the research and evaluation competency area yielded an F of 4.50 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 2-5 years ($\bar{x} = 30.32$), 6-9 years ($\bar{x} = 30.18$) and 10 years and above ($\bar{x} = 34.19$) tenure groups but no significant difference between 2-5 years and 6-9 years tenure groups. The null hypothesis was rejected and the alternative hypothesis of difference in the degree of competence possessed by technical officers in the nine competency areas was accepted. The probability of the differences between tenure groups arising by chance for the nine tests conducted for the degree of competence possessed in the nine competency areas ranged from .005 to .208. Per item scores as shown in Table 13 and an

Table 13.--Analysis of Variance for Technical Officer Tenure Groups with Respect to the Degree of Competence Possessed by Technical Officers in the Nine Competency Areas.

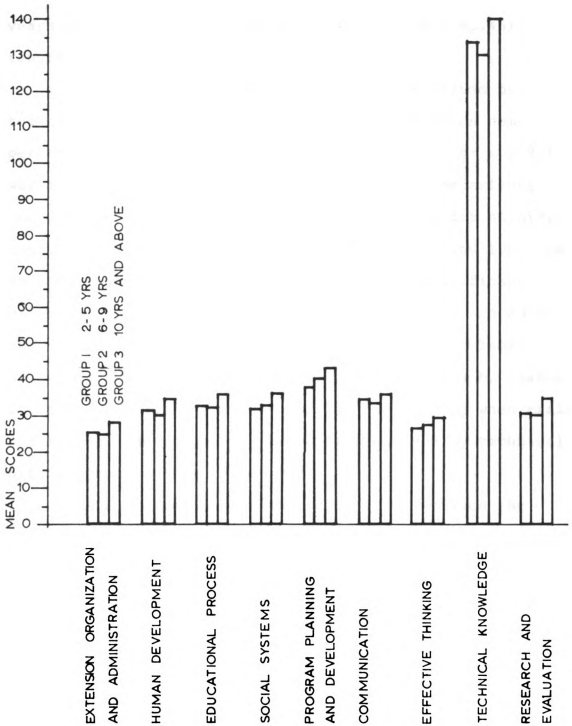
	1 (2-5 years) $\bar{x}$			2 (6-9 years) $\bar{x}$			3 (10 years & above) $\bar{x}$			MS	MS				Tukey Post Hoc Subsets		
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Between	Within	df	F	P	1	2	3
Extension Organization and Administration	25.26	3.16	6.37	24.78	3.09	6.64	27.93	3.49	6.23	220.04	41.19	2,231	5.34	.005*	2,1	3	
Human Development	31.19	3.12	8.99	30.09	3.0	8.91	34.41	3.44	8.51	386.50	77.75	2,231	4.97	.008*	2,1	1,3	
Educational Process	32.86	3.29	9.71	31.99	3.20	8.88	35.53	3.55	8.49	260.99	81.996	2,231	3.18	.043*	2,1	1,3	
Social Systems	31.92	3.19	8.40	32.75	3.27	8.09	36.11	3.61	8.25	376.22	68.07	2,231	5.53	.005*	1,2	3	
Program Planning and Development	37.79	3.15	10.38	40.07	3.34	10.56	42.93	3.58	10.52	513.57	110.03	2,231	4.67	.010*	1,2	2,3	
Communication	34.39	3.44	8.94	33.30	3.33	9.17	35.89	3.59	9.10	129.83	82.23	2,231	1.58	.208			
Effective Thinking	26.59	2.95	7.59	27.66	3.07	8.10	29.31	3.26	7.71	144.68	60.96	2,231	2.37	.095			
Technical Knowledge	133.32	3.42	30.59	130.04	3.33	26.84	140.24	3.59	26.99	2076.64	796.68	2,231	2.61	.076			
Research and Evaluation	30.32	3.03	10.01	30.18	3.02	9.13	34.19	3.42	8.92	395.00	87.94	2,231	4.50	.012*	2,1	3	

Scale: $\frac{1}{2}$ - Low Competence 3 - Average Competence $\frac{4}{5}$ - High Competence

examination of the graphic illustration in Figure 1, disclosed that technical officers with over ten years experience in the field have higher degree of competence than those with 2-5 years and 6-9 years field experience in the areas of extension organization and administration, human development, educational process, social systems, program planning and development and research and evaluation. There was no significant difference in the degree of competence possessed by the three tenure groups of technical officers in the areas of communication, effective thinking, and technical subject matter.

On the whole, respondents in all the three tenure groups indicated that they possessed an average degree of competence in the nine competency areas. The question on when training was received by technical officers in the nine competency areas, three areas--effective thinking, technical knowledge and research--yielded significant differences.

The question on when training was received in the effective thinking competency area yielded an F of 3.73 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 6-9 years ($\bar{x} = 20.90$) and 10 years and above ($\bar{x} = 86.80$) tenure groups but no significant difference between either 2-5



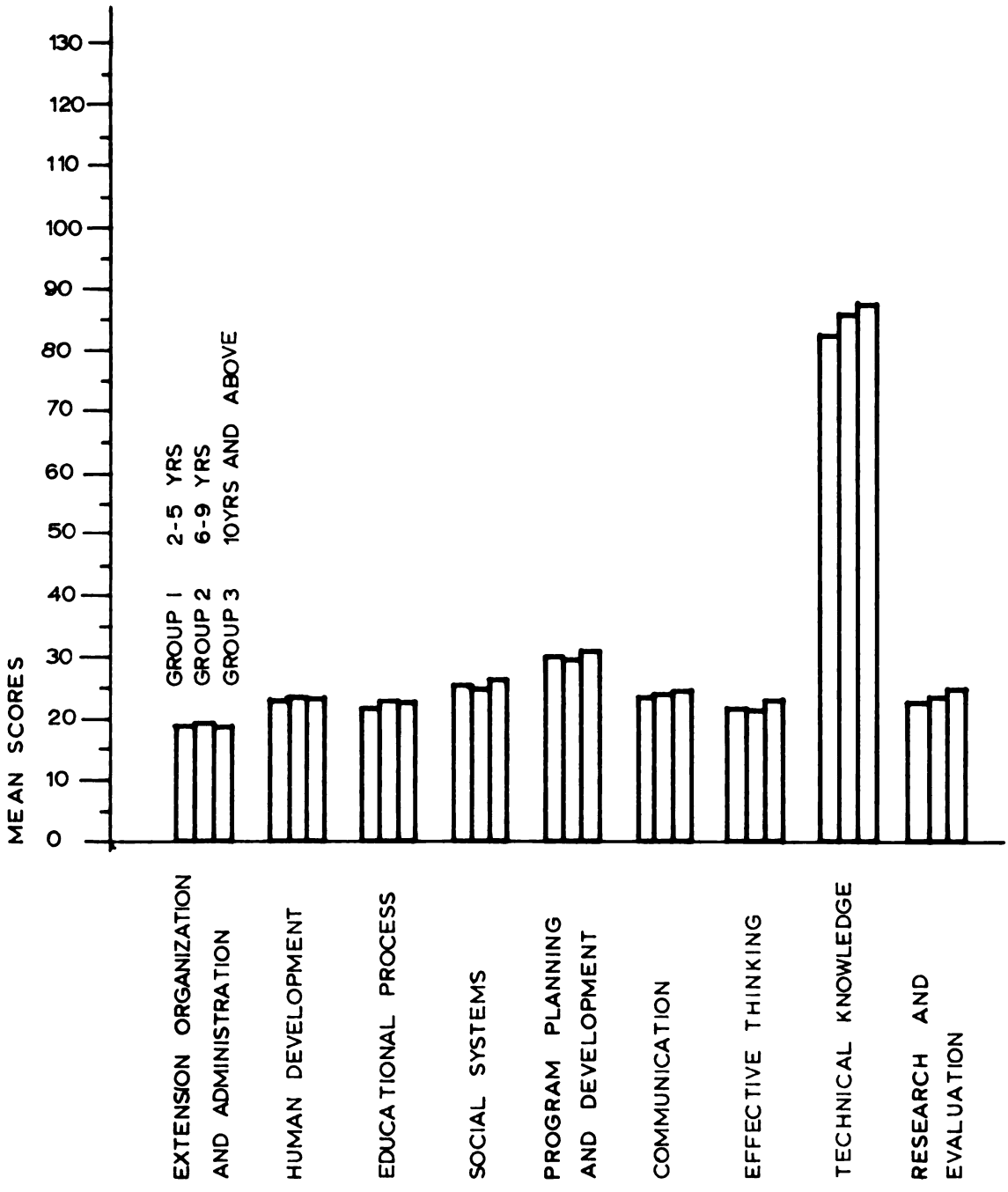
DIFFERENCES BETWEEN TECHNICAL OFFICER TENURE GROUPS (BY GROUP MEANS) ON THE DEGREE OF COMPETENCE POSSESSED IN THE NINE COMPETENCY AREAS.

FIGURE 1

years or 10 years and above and 6-9 years ($\bar{x}$ = 85.45) tenure groups.

The question on when training was received by technical officers in the research and evaluation competency area yielded an F of 7.99 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between 2-5 years ($\bar{x}$ = 22.20) and 10 years and above ($\bar{x}$ = 24.17) tenure groups but no significant difference between either 2-5 years or 10 years and above and 6-9 years ($\bar{x}$ = 23.15) tenure groups. The probability of the differences between tenure groups arising by chance for the nine tests conducted for the question on when training in the nine competency areas was received by technical officers ranged from .0 to .974.

A representation of the difference between the three tenure groups (2-5 years, 6-9 years and 10 years and above) of technical officers on when training in the nine competency areas was received is shown in Figure 2. Observation of per item scores in Table 14 and the graphic illustration revealed that in the areas of effective thinking, technical knowledge and research and evaluation, technical officers with over 10 years field experience gained their competence after college and technical officers with 2-5 years and 6-9 years field experience gained their competence in college. All the three groups



DIFFERENCES BETWEEN TECHNICAL OFFICER TENURE GROUPS (BY GROUP MEANS) ON WHEN TRAINING SHOULD BE GIVEN IN THE NINE COMPETENCY AREAS.

FIGURE 2

Table 14.--Analysis of Variance for Technical Officer Tenure Groups with Respect to When Training Should be Given in the Nine Competency Areas.

	1 (2-5 years)			2 (6-9 years)			3 (10 years & above)			MS	MS				Tukey Post Hoc Subsets		
	Raw Score	$\bar{x}$ Per Item Score	SD	Raw Score	$\bar{x}$ Per Item Score	SD	Raw Score	$\bar{x}$ Per Item Score	SD	Between	Within	df	F	P	1	2	3
Extension Organization and Administration	18.69	2.33	22.21	18.77	2.35	2.71	18.69	2.33	2.80	.176	6.66	2,231	.026	.974			
Human Development	22.50	2.25	3.94	23.05	2.30	4.65	22.95	2.29	5.12	6.97	21.01	2,231	.323	.724			
Educational Process	21.60	2.16	3.09	22.68	2.27	3.88	22.44	2.24	4.10	25.65	13.73	2,231	1.87	.157			
Social Systems	24.99	2.58	3.58	24.57	2.46	3.99	25.27	2.53	4.24	9.51	15.54	2,231	.612	.543			
Program Planning and Development	29.77	2.48	4.74	29.53	2.46	4.44	30.67	2.55	4.83	27.30	21.82	2,231	1.25	.288			
Communication	23.29	2.33	3.57	23.54	2.35	3.49	24.05	2.40	4.06	11.69	13.74	2,231	.851	.428			
Effective Thinking	21.22	2.36	3.63	20.90	2.32	3.95	22.48	2.49	3.75	53.28	14.29	2,231	3.73	.026*	2,1	1,3	
Technical Knowledge	82.07	2.10	7.86	85.45	2.19	7.78	86.80	2.22	12.45	463.45	91.29	2,231	5.08	.007*	1,2	2,3	
Research and Evaluation	22.20	2.22	2.60	23.15	2.31	3.17	24.17	2.42	3.41	75.37	9.44	2,231	7.94	.000*	1,2	2,3	

Scale: 1 - Before College
2 - In College
3 - After College

gained their competence in the remaining six competency areas in college.

The question on the importance of communication competency area yielded an F of 3.55 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences, revealed a significant difference between 6-9 years ($\bar{x} = 1.14$) and 2-5 years ($\bar{x} = 1.35$) tenure groups but no significant difference between either 6-9 years or 2-5 years and 10 years and above ($\bar{x} = 1.29$) tenure groups.

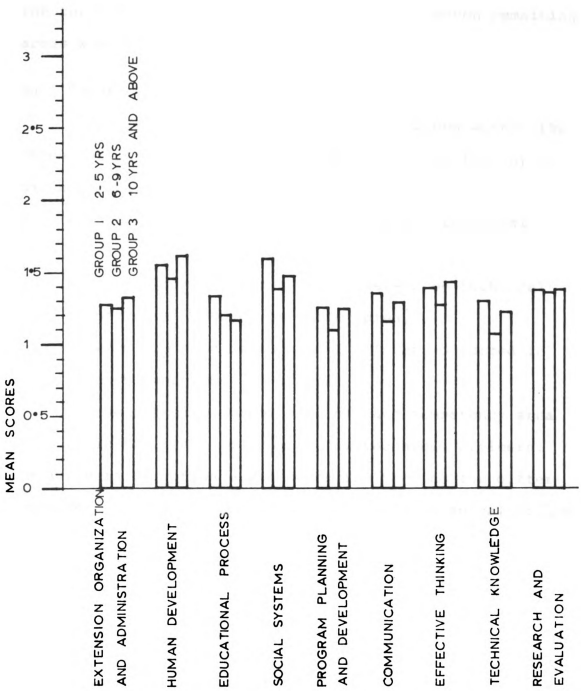
The question on the importance of the technical knowledge competency area yielded an F of 8.38 which with a df = 2,231 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences, revealed a significant difference between 6-9 years ($\bar{x} = 1.04$) and 2-5 years ($\bar{x} = 1.29$) tenure groups but no significant difference between either 6-9 years or 2-5 years and 10 years and above ($\bar{x} = 1.21$) tenure groups. The probability of the differences between tenure groups arising by chance for the seven out of nine tests conducted for the importance of the nine competency areas ranged from .064 to .986.

As shown in Table 15 and in Figure 3, technical officers with 2-5 years of field experience indicated that the areas of communication and technical knowledge were very important to be included in the training program.

Table 15.--Analysis of Variance for Technical Officer Tenure Groups with Respect to the Importance of the Nine Competency Areas.

Tenure Groups / Competency Areas (Content Areas)	Group 1 2-5 years $\bar{X}$	Group 1 2-5 years S	Group 2 6-9 years $\bar{X}$	Group 2 6-9 years S	Group 3 10 years & above $\bar{X}$	Group 3 10 years & above S	MS Between	MS Within	df	F	P	Subjects 1	Subjects 2
Extension Organization and Administration	1.27	.48	1.24	.49	1.32	.52	.122	.245	2,231	.497	.609		
Human Development	1.54	.57	1.45	.57	1.61	.52	.479	.308	2,231	1.55	.214		
Educational Process	1.32	.55	1.19	.43	1.16	.44	.607	.224	2,231	2.707	.069		
Social Systems	1.59	1.00	1.38	.54	1.47	.55	.865	.539	2,231	1.604	.203		
Program Planning and Development	1.24	.60	1.09	.33	1.23	.42	.542	.216	2,231	2.504	.084		
Communication	1.35	.55	1.14	.41	1.29	.56	.941	.265	2,231	3.553	.030*	2,3	3,1
Effective Thinking	1.39	.49	1.26	.47	1.43	.57	.547	.263	2,231	2.080	.127		
Technical Knowledge	1.29	.48	1.04	.25	1.21	.41	1.30	.155	2,231	8.378	.000*	2,3	3,1
Research	1.37	.49	1.35	1.00	1.37	1.02	.010	.755	2,231	.014	.986		

Scale: 0 - Not Important
1 - Important
2 - Very Important



DIFFERENCES BETWEEN TECHNICAL OFFICER TENURE GROUPS (BY GROUP MEANS) ON THE IMPORTANCE OF THE NINE COMPETENCY AREAS

FIGURE 3

The three tenure groups indicated that the seven remaining areas were important.

Null Hypothesis IV

There is no difference between regions within the Technical Officer population in mean response for any of the nine competency areas in:

(a) the perceived need for training for technical officers in each competency area,

(b) the degree of competence possessed by technical officers in each competency area,

(c) when training of technical officers occurred in each competency area, and

(d) the perceived importance of each competency area in the training program for technical officers.

An analysis of variance was conducted testing for difference between the eight regions within the technical officer population for each of the nine competency areas by four question types: (1) need for training, (2) degree of competence possessed, (3) when training occurred, and (4) the importance of the competency areas. A summary of the analysis of variance results of null hypothesis IV is presented in Tables 16, 17, 18 and 19.

The question on the need for training in the human development competency area yielded an F of 2.15 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons were conducted to test pairwise differences

Table 16.--Analysis of Variance for Technical Officer Region Groups with Respect to the Need for Training in the Nine Competency Areas.

	1. Greater Accra			2. Ashanti			3. Western			4. Central			5. Volta			6. Brong Ahafo			7. Eastern			8. Northern								Tukey Post Hoc Subsets	
	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	$\bar{x}$ Raw Score	$\bar{x}$ Per Item Score	SD	MS Between	MS Within	df	F	P	1	2
Extension Organization and Administration	8.22	1.03	1.23	8.24	1.03	1.72	8.24	1.03	.95	8.25	1.03	2.41	8.30	1.04	1.21	8.10	1.01	1.54	8.28	1.03	1.72	8.70	1.08	2.38	.95	2.92	7,226	.314	.947		
Human Development	10.42	1.04	2.99	10.48	1.04	2.29	10.85	1.08	2.69	11.63	1.16	3.49	11.23	1.12	2.75	10.93	1.09	2.66	11.25	1.12	2.96	12.93	1.29	3.82	19.20	8.95	7,226	2.146	.040	1,2, 3,5, 7,4	3, 5,7, 4,6
Educational Process	11.10	1.11	2.71	9.52	.95	2.57	10.69	1.07	1.28	10.22	1.02	3.64	11.03	1.10	3.49	10.83	1.08	2.03	10.25	1.02	3.03	11.43	1.14	3.94	10.95	8.71	7,226	1.26	.272		
Social Systems	10.06	1.01	2.08	9.93	.99	2.36	10.27	1.03	1.13	10.30	1.03	2.66	10.50	1.05	3.02	10.30	1.03	1.62	10.07	1.01	3.07	10.93	1.09	3.38	2.91	6.34	7,226	.459	.863		
Program Planning and Development	12.06	1.00	3.42	12.14	1.01	1.96	11.69	.97	3.85	12.52	1.04	1.55	12.43	1.03	2.81	12.27	1.02	1.26	11.39	.95	4.02	12.73	1.06	3.05	5.59	8.49	7,226	.658	.708		
Communication	11.10	1.11	2.41	10.31	1.03	1.31	10.21	1.02	2.38	11.07	1.11	1.92	10.03	1.00	1.85	10.73	1.07	2.15	10.07	1.01	2.61	11.47	1.15	2.84	8.71	4.99	7,226	1.746	.100		
Effective Thinking	10.03	1.11	3.10	9.03	1.00	2.09	10.38	1.15	2.32	9.63	1.07	1.86	9.70	1.07	2.42	9.33	1.04	1.32	9.57	1.06	2.15	11.17	1.24	2.92	13.22	5.52	7,226	2.40	.022	2,6, 7,4, 5,3	6,7, 4,5, 3,
Technical Knowledge	40.77	1.04	7.57	38.38	.98	5.33	41.07	1.05	5.90	42.37	1.08	4.70	41.70	1.07	6.89	41.17	1.05	5.93	39.68	1.02	7.75	42.63	1.09	10.11	56.56	48.89	7,226	1.16	.329		
Research and Evaluation	10.90	1.09	2.40	10.03	1.00	1.66	10.10	1.01	1.75	10.55	1.05	1.60	10.57	1.06	2.19	10.63	1.06	1.56	10.03	1.00	2.27	11.77	1.18	3.54	10.01	4.93	7,226	2.03	.052		

Scale: 0 - Not Needed
1 - Needed

Table 17.--Analysis of Variance for Technical Officer Region Groups with Respect to the Degree of Competence Possessed by Technical Officers in the Nine Competency Areas.

	1. Greater Accra			2. Ashanti			3. Western			4. Central			5. Volta			6. Brong Ahafo			7. Eastern			8. Northern							
	$\bar{x}$			$\bar{x}$			$\bar{x}$			$\bar{x}$			$\bar{x}$			$\bar{x}$			$\bar{x}$			$\bar{x}$							
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets 1	Tukey Post Hoc Subsets 2
Extension Organization and Administration	26.22	3.28	6.90	27.00	3.37	7.06	26.83	3.35	6.23	26.37	3.30	6.55	25.07	3.13	5.04	25.47	3.18	5.84	26.64	3.33	7.85	23.90	2.99	7.22	33.02	43.94	7,226	.751	.629		
Human Development	30.22	3.02	9.99	34.62	3.46	8.30	33.79	3.38	7.29	32.33	3.23	8.89	31.37	3.14	8.49	31.23	3.12	7.44	32.50	3.25	9.57	28.57	2.86	11.25	110.43	81.06	7,226	1.36	.222		
Educational Process	31.84	3.18	10.42	35.14	3.51	8.19	36.72	3.62	7.08	33.85	3.38	9.28	32.20	3.22	9.52	32.13	3.21	6.78	35.28	3.53	9.34	30.77	3.08	10.93	126.80	82.15	7,226	1.54	.154		
Social Systems	32.71	3.27	7.34	35.10	3.51	7.91	36.17	3.62	8.67	34.07	3.41	7.31	32.40	3.24	7.83	33.70	3.37	6.26	32.11	3.21	9.43	32.33	3.23	11.47	63.11	70.80	7,226	.89	.514		
Program Planning and Development	38.29	3.19	10.30	41.96	3.50	10.12	42.21	3.51	11.87	42.18	3.51	9.45	40.90	3.41	8.93	38.80	3.23	8.93	38.71	3.22	12.16	38.73	3.23	13.01	89.49	114.36	7,226	.78	.603		
Communication	32.93	3.29	9.48	36.14	3.61	8.33	36.96	3.70	8.99	36.41	3.64	8.11	34.83	3.48	8.39	32.10	3.21	7.97	35.61	3.56	8.92	31.33	3.13	11.28	134.20	81.13	7,226	1.65	.121		
Effective Thinking	24.97	2.77	6.74	31.69	3.52	7.32	30.24	3.36	7.80	28.11	3.12	7.57	27.43	3.05	8.00	28.03	3.11	5.74	27.71	3.08	6.96	24.47	2.72	10.19	171.72	58.36	7,226	2.94	.006	8,1,5, 7,6,4, 3	5,7,6, 4,3,2
Technical Knowledge	127.45	3.27	25.50	143.62	3.68	29.19	144.10	3.69	26.80	133.04	3.41	23.32	132.10	3.39	30.32	127.97	3.28	21.88	137.11	3.51	28.95	130.13	3.34	36.67	1270.48	795.52	7,226	1.60	.137		
Research and Evaluation	28.90	2.90	9.21	33.34	3.34	9.08	33.10	3.31	8.51	31.85	3.18	8.50	31.57	3.16	9.75	30.47	3.05	7.62	33.64	3.36	9.96	29.33	2.93	12.52	98.16	90.38	7,226	1.09	.373		

Scale: 1, 2 - Low Competence 3 - Average Competence 4, 5 - High Competence

Table 18.--Analysis of Variance for Technical Officer Region Groups with Respect to When Training Should be Given in the Nine Competency Areas.

	1. Greater Accra			2. Ashanti			3. Western			4. Central			5. Volta			6. Brong Ahafo			7. Eastern			8. Northern								
	$\bar{X}$			$\bar{X}$			$\bar{X}$			$\bar{X}$			$\bar{X}$			$\bar{X}$			$\bar{X}$			$\bar{X}$								
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets 1	Tukey Post Hoc Subsets 2
Extension Organization and Administration	18.93	2.37	2.32	18.59	2.32	2.69	19.34	2.42	2.02	18.48	2.31	3.33	18.63	2.33	2.78	18.23	2.28	2.18	18.93	2.37	2.45	19.30	2.41	2.13	4.52	6.30	7,226	.72	.657		
Human Development	22.58	2.26	4.21	23.07	2.31	4.45	24.59	2.46	4.66	21.89	2.19	4.26	22.60	2.26	5.43	22.77	2.28	4.53	23.03	2.30	3.93	23.70	2.37	4.36	18.97	20.29	7,226	.93	.480		
Educational Process	21.71	2.17	4.19	22.59	2.26	2.64	23.07	2.31	4.03	22.78	2.28	3.55	21.97	2.20	4.39	21.67	2.17	3.59	22.53	2.25	3.58	22.13	2.21	3.46	7.75	13.86	7,226	.56	.789		
Social Systems	24.93	2.49	3.90	24.90	2.49	3.83	26.93	2.69	2.89	24.70	2.47	4.03	24.23	2.42	4.13	23.90	2.39	4.39	25.18	2.52	3.51	25.97	2.60	3.90	27.42	14.81	7,226	1.85	.079		
Program Planning and Development	29.32	2.44	5.05	30.55	2.54	3.94	31.69	2.64	4.11	29.96	2.50	4.26	29.17	2.43	5.63	29.17	2.43	5.36	30.50	2.54	4.71	31.23	2.60	3.96	28.02	21.91	7,226	1.28	.262		
Communication	23.77	2.38	4.39	23.27	2.33	2.68	25.10	2.51	3.64	23.30	2.33	4.15	23.03	2.30	2.95	22.27	2.23	3.92	23.28	2.33	3.56	25.43	2.54	3.38	33.82	13.14	7,226	2.57	.014	6,5,2,8	5,2,7,4,1,3,8
Effective Thinking	21.81	2.42	4.42	21.38	2.37	3.36	21.76	2.42	4.44	21.30	2.37	3.41	20.40	2.27	2.92	21.30	2.37	4.34	21.00	.33	3.21	24.00	2.67	3.14	33.51	13.79	7,226	2.43	.020	5,7,4,1	6,2,3,4,6,2
Technical Knowledge	87.16	2.23	11.81	85.38	2.19	8.74	84.93	2.18	9.14	85.70	2.20	10.64	84.57	2.17	11.03	80.93	2.07	6.57	86.03	2.20	10.41	87.43	2.24	8.98	122.21	95.81	7,226	1.28	.263		
Research and Evaluation	24.06	2.41	4.19	23.65	2.36	2.74	23.48	2.35	2.84	23.55	2.35	2.90	22.17	2.22	2.72	21.83	2.18	2.92	23.00	2.30	3.09	24.07	2.41	3.00	20.92	9.58	7,226	2.18	.037		

Scale: 1 - Before College
2 - In College
3 - After College

Table 19.--Analysis of Variance for Technical Officer Region Groups with Respect to the Importance of the Nine Competency Areas.

	1. Greater Accra		2. Ashanti		3. Western		4. Central		5. Volta		6. Brong Ahafo		7. Eastern		8. Northern		MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD						1	2
Extension Organization and Administration	1.29	.46	1.41	.57	1.17	.38	1.22	.42	1.20	.48	1.30	.53	1.28	.53	1.33	.55	.18	.25	7,226	.717	.658		
Human Development	1.68	.54	1.76	.58	1.48	.57	1.30	.46	1.67	.55	1.53	.57	1.43	.50	1.37	.56	.77	.30	7,226	2.60	.014	4,8,7, 3,6,5, 1	8,7,3, 6,5,1, 2
Educational Process	1.29	.59	1.27	.53	1.24	.51	1.15	.36	1.27	.52	1.13	.34	1.11	.31	1.33	.55	.20	.22	7,226	.888	.516		
Social Systems	1.58	.72	1.76	1.48	1.48	.51	1.48	.51	1.43	.57	1.33	.48	1.43	.57	1.33	.48	.57	.54	7,226	1.05	.394		
Program Planning and Development	1.42	.62	1.24	.43	1.24	.43	1.04	.19	1.07	.45	1.13	.34	1.25	.52	1.07	.52	.50	.21	7,226	2.39	.023	4,5,8, 6,2,3, 7	5,8,6, 2,3,7, 1
Communication	1.32	.60	1.34	.61	1.31	.47	1.07	.38	1.23	.57	1.23	.43	1.39	.57	1.13	.43	.34	.27	7,226	1.26	.271		
Effective Thinking	1.55	.62	1.38	.49	1.31	.47	1.30	.46	1.37	.56	1.30	.47	1.28	.46	1.37	.57	.22	.27	7,226	.834	.560		
Technical Knowledge	1.19	.40	1.17	.38	1.14	.44	1.15	.36	1.33	.55	1.17	.38	1.14	.36	1.10	.30	.15	.16	7,226	.897	.510		
Research and Evaluation	1.35	.55	1.69	1.49	1.45	.57	1.26	.52	1.43	.57	1.33	1.47	1.21	.42	1.17	.38	.79	.74	7,226	1.06	.389		

Scale: 0 - Not Important
1 - Important
2 - Very Important

revealing a significant difference between Brong Ahafo Region ($\bar{x}$ = 10.93) and Northern Region ($\bar{x}$ = 12.93), but neither Brong Ahafo nor Northern Regions were significantly different from Greater Accra ($\bar{x}$ = 10.42), Ashanti ($\bar{x}$ = 10.48), Western ($\bar{x}$ = 10.85), Central ($\bar{x}$ = 11.63), Volta ($\bar{x}$ = 11.23) and Eastern ($\bar{x}$ = 11.25) regions.

The question on the need for training in the effective thinking competency area yielded an F of 2.40 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons were conducted to test pairwise differences revealing a significant difference between Ashanti Region ($\bar{x}$ = 9.03) and Northern Region ($\bar{x}$ = 11.17) but neither Ashanti nor Northern Regions were significantly different from Greater Accra ($\bar{x}$ = 10.03), Western ($\bar{x}$ = 10.38), Central ($\bar{x}$ = 9.63), Volta ($\bar{x}$ = 9.70), Brong Ahafo ($\bar{x}$ = 9.33) and Eastern ($\bar{x}$ = 9.57) Regions.

The question on the degree of competence possessed by technical officers in the effective thinking competency area yielded an F of 2.94 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons were conducted to test pairwise differences revealing a significant difference between Ashanti Region ($\bar{x}$ = 31.69) and Northern Region ($\bar{x}$ = 24.47), between Ashanti and Greater Accra ($\bar{x}$ = 24.97) but neither Ashanti, Northern nor Greater Accra Regions were significantly different from Western ($\bar{x}$ = 30.24), Central ($\bar{x}$ = 28.11), Volta ($\bar{x}$ =

27.43), Brong Ahafo ($\bar{x}$ = 28.03) and Eastern ($\bar{x}$ = 27.71) Regions.

The question on when training occurred in the communication competency area yielded an F of 2.57 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons were conducted to test pairwise differences revealing a significant difference between Brong Ahafo Region ($\bar{x}$ = 22.27) and Northern Region ($\bar{x}$ = 25.43) but neither Brong Ahafo nor Northern Regions were significantly different from Greater Accra ($\bar{x}$ = 23.77), Ashanti ($\bar{x}$ = 23.27), Western ($\bar{x}$ = 25.10), Central ($\bar{x}$ = 23.30), Volta ($\bar{x}$ = 23.03) and Eastern ($\bar{x}$ = 23.38) Regions.

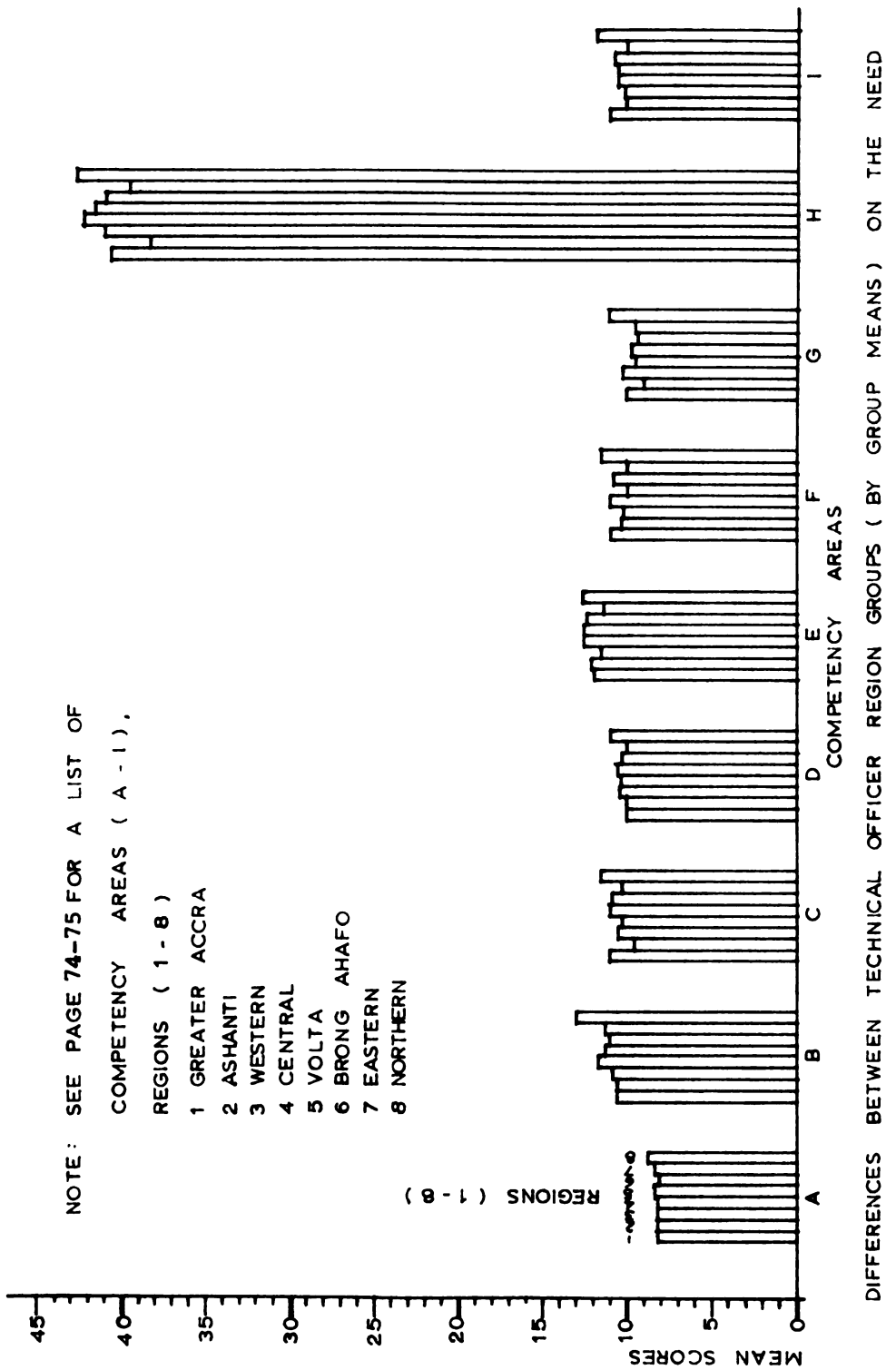
The question on when training occurred in the effective thinking competency area yielded an F of 2.43 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between Volta Region ($\bar{x}$ = 20.40) and Northern Region ($\bar{x}$ = 24.00) but neither Volta nor Northern Regions were significantly different from Eastern ($\bar{x}$ = 21.00), Central ($\bar{x}$ = 21.30), Brong Ahafo ($\bar{x}$ = 21.30), Ashanti ($\bar{x}$ = 21.38), Western ($\bar{x}$ = 21.76), and Greater Accra ($\bar{x}$ = 21.81) Regions.

The question on the degree of importance of the human development competency area yielded an F of 2.60 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences

revealed a significant difference between Central Region ($\bar{x}$ = 1.30) and Ashanti Region ($\bar{x}$ = 1.53), Volta ($\bar{x}$ = 1.67) and Greater Accra ($\bar{x}$ = 1.68) Regions.

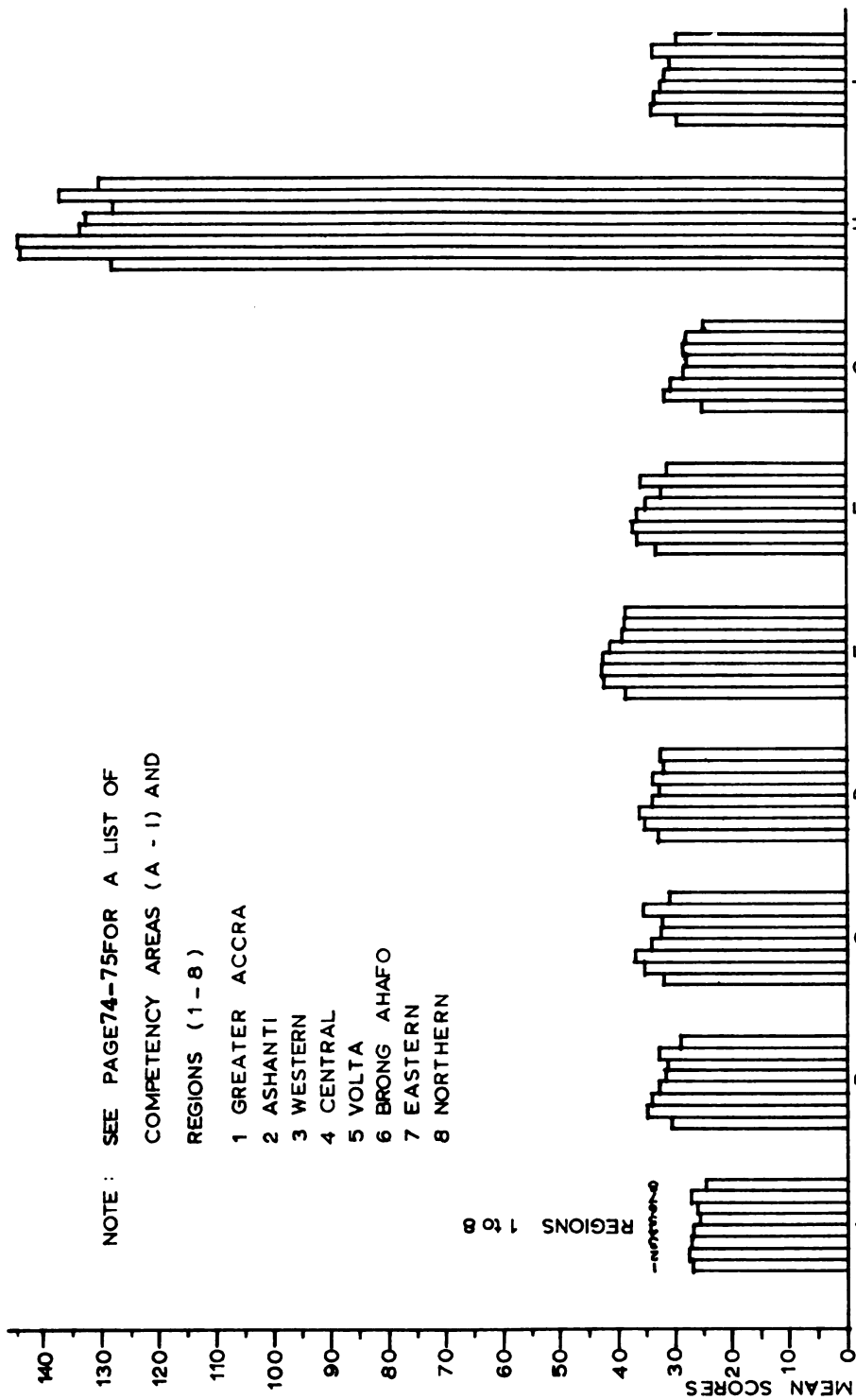
The question on the degree of importance of the program planning and development competency area yielded an F of 2.39 which with a df = 7,226 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between Central Region ($\bar{x}$ = 1.04) and Greater Accra Region ($\bar{x}$ = 1.42), but neither Central nor Greater Accra Regions differ significantly from Volta ($\bar{x}$ = 1.07), Northern ($\bar{x}$ = 1.07), Brong Ahafo ($\bar{x}$ = 1.13), Ashanti ($\bar{x}$ = 1.24), Western ($\bar{x}$ = 1.24) and Eastern ($\bar{x}$ = 1.25) Regions.

A representation of the difference between regional groups of technical officers in their perceived need for training in the nine competency areas is shown in Figure 4. Observation of the graphic illustration and the per item scores in Table 16 revealed that all respondents in the eight regions indicated that the program of training for technical officers should include all the nine areas. However, respondents in the Ashanti and the Central regions felt the need for more training in the human development area and respondents in the Western and Northern Region felt the need for more training in the effective thinking area. The per item scores in Table 17 and the graphic illustration in Figure 5 disclosed that respondents in



DIFFERENCES BETWEEN TECHNICAL OFFICER REGION GROUPS (BY GROUP MEANS) ON THE NEED FOR TRAINING IN THE NINE COMPETENCY AREAS.

FIGURE 4



DIFFERENCES BETWEEN TECHNICAL OFFICER REGION GROUPS (BY GROUP MEANS) ON THE DEGREE OF COMPETENCE POSSESSED IN THE NINE COMPETENCY AREAS.

FIGURE 5

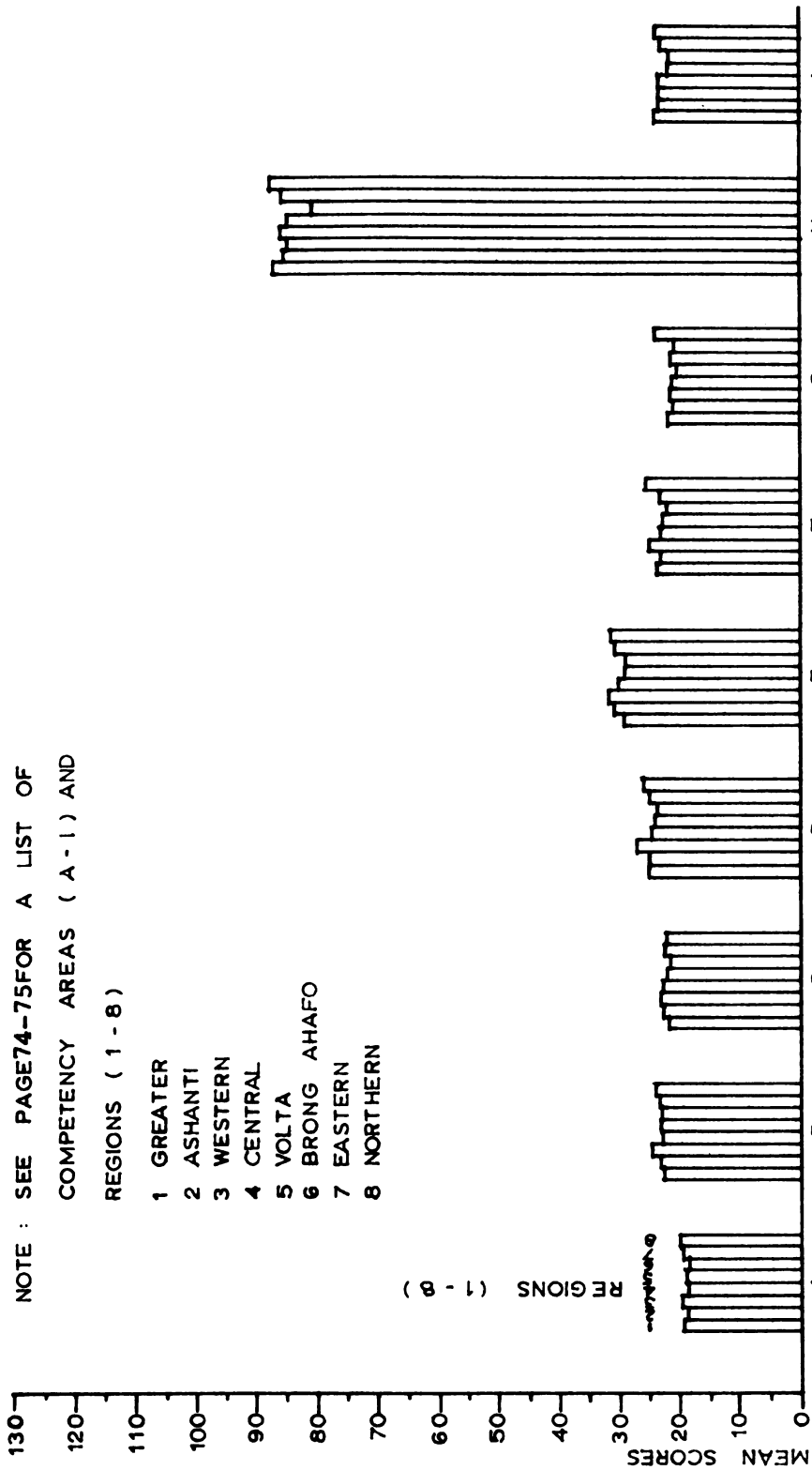
Ashanti, Western, Central, Volta, Brong Ahafo and Eastern regions indicated that they possessed an average degree of competence in all the nine competency areas. Respondents in the Greater Accra and Northern regions indicated that they possessed an average degree of competence in all the areas except in the effective thinking area where they indicated a below average degree of competence.

As shown in Figure 6 and Table 18 all respondents in the eight regions indicated that they had training in the nine competency areas in an agricultural college except respondents in the Northern Region who had their training in communication and effective thinking areas after college.

The per item scores as reported in Table 19 and the graphic presentation in Figure 7 on the importance of the nine competency areas revealed that respondents in Greater Accra, Ashanti and Volta regions found the area of human development very important and respondents in Greater Accra and Ashanti regions found the area of social systems very important to be included in the pre-service training program for technical officers. All the other competency areas were found to be important by the remaining six regional groups.

Null Hypothesis V

There is no difference between the three populations of (1) faculty of agricultural colleges, (2) senior



DIFFERENCES BETWEEN TECHNICAL OFFICER REGION GROUPS (BY GROUP MEANS) ON WHEN TRAINING SHOULD BE GIVEN IN THE NINE COMPETENCY AREAS.

FIGURE 6

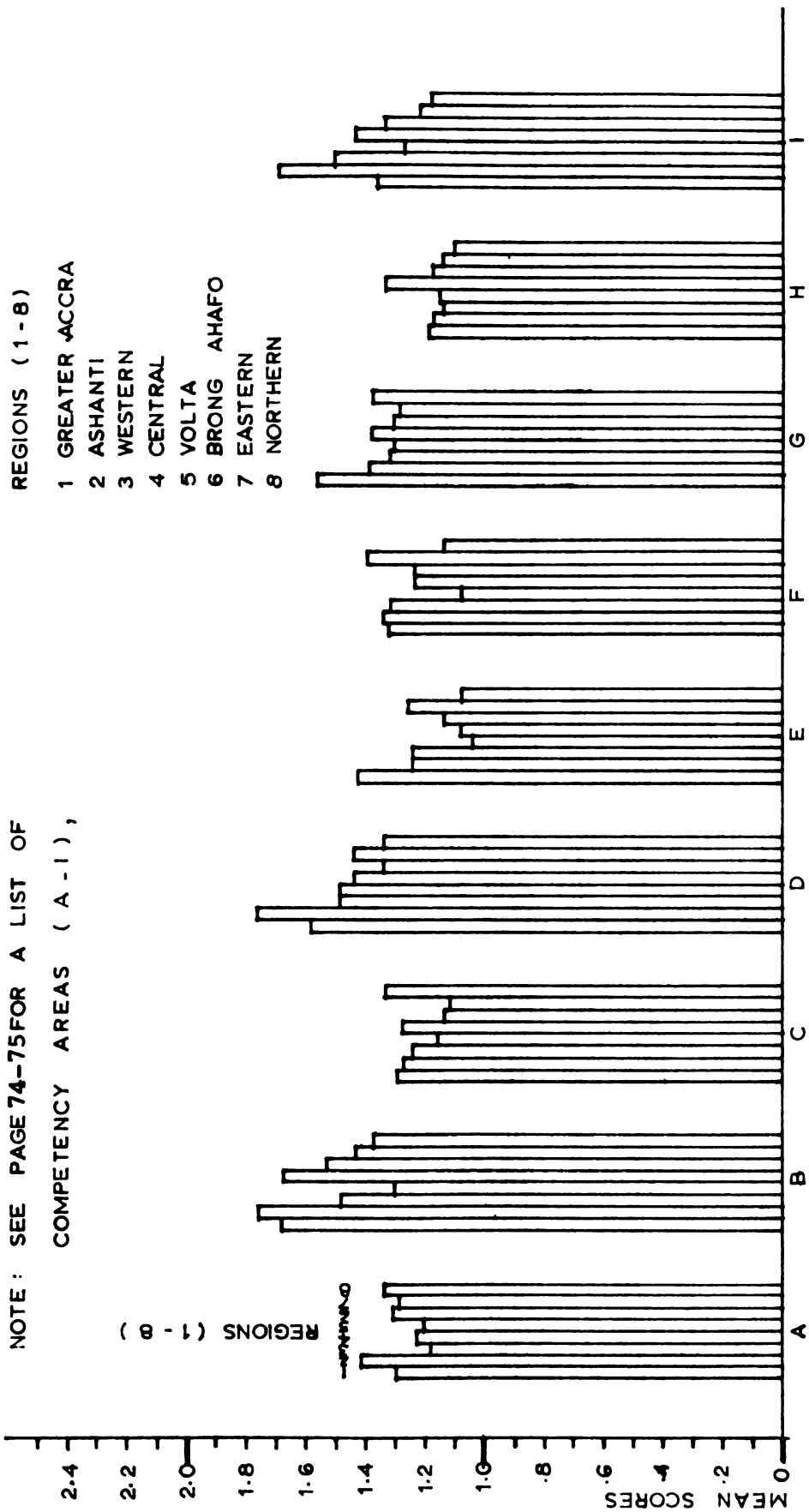


FIGURE 7

DIFFERENCES BETWEEN TECHNICAL OFFICER REGION GROUPS (BY GROUP MEANS) ON THE IMPORTANCE OF THE NINE COMPETENCY AREAS.

technical officers and (3) technical officers in mean response for any of the nine competency areas in:

(1) the perceived need for training for technical officers in each competency area,

(2) the degree of competence possessed by technical officers in each competency area,

(3) when training of technical officers should occur in each competency area, and

(4) the perceived importance of each competency area in the training program for technical officers.

An analysis of variance was conducted testing for difference between the three populations--college, senior technical officers, and technical officers--for each of the nine competency areas by three question types: (1) need for training, (2) when training should occur, and (3) the importance of the competency areas. The analysis of variance was also conducted testing for difference between the senior technical officer and technical officer populations in the degree of competence possessed by technical officers in the nine competency areas.

The question on the need for training in the human development competency area yielded an F of 3.40 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between technical officer population ($\bar{x} = 9.06$) and senior technical officer population

($\bar{x}$ = 9.77) but no significant difference was found between either technical officer or senior technical officer populations and college population ($\bar{x}$ = 9.33).

The question on the need for training in the effective thinking competency area yielded an F of 70.52 which with a df = 2,034 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x}$ = 5.64) and technical officer population ($\bar{x}$ = 8.31) but no significant difference between technical officer and college ($\bar{x}$ = 8.17) populations.

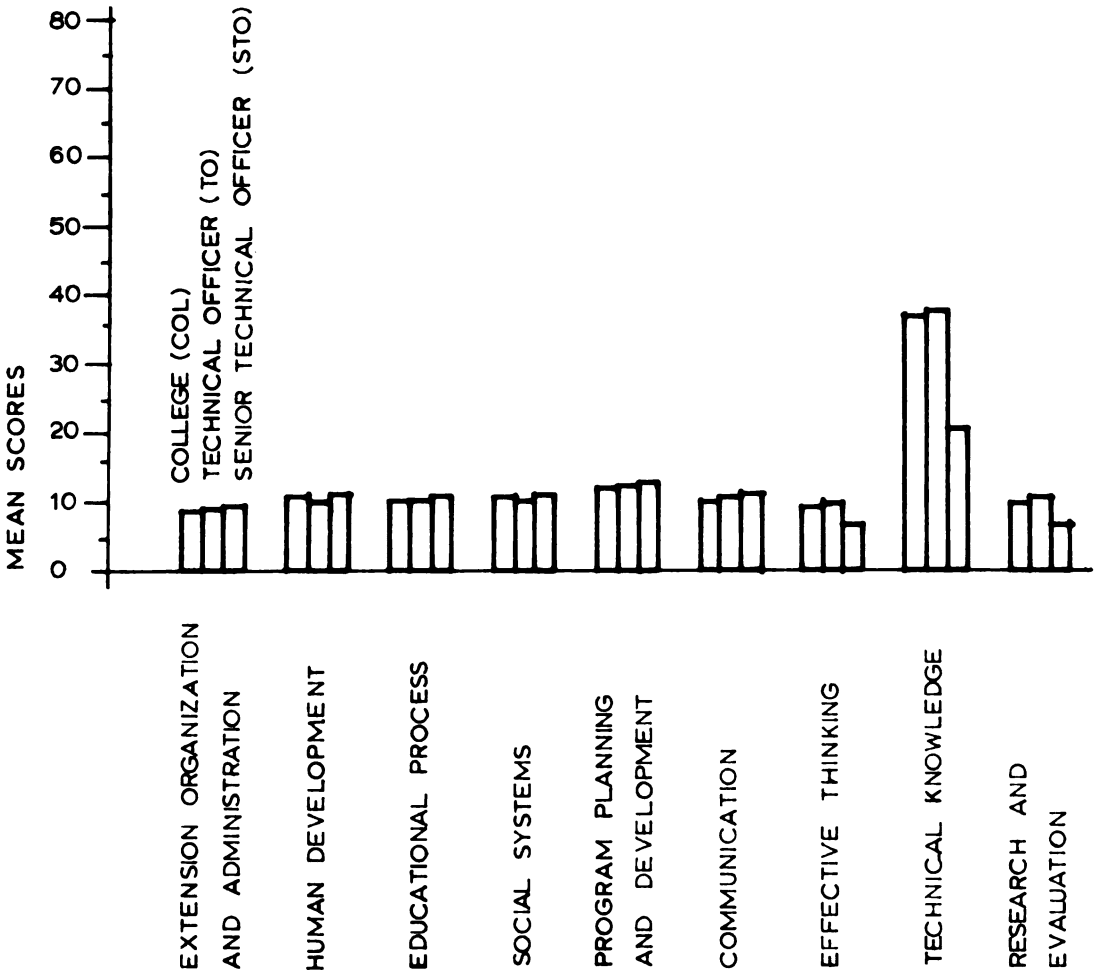
The question on the need for training in the technical knowledge competency area yielded an F of 290.56 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer ($\bar{x}$ = 19.73) and technical officer ($\bar{x}$ = 36.95) populations but no significant differences between technical officer and college ($\bar{x}$ = 36.79) populations.

The question on the need for training in the research and evaluation competency area yielded an F of 179.34 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between the three populations--senior technical officer ($\bar{x}$ = 6.00), college ($\bar{x}$ = 8.92) and technical officer ($\bar{x}$ = 9.65).

The hypothesis of no difference between the populations in the need for training in the nine competency areas was rejected and the alternative hypothesis of difference between the populations was accepted. The probability of the differences between the populations arising by chance for the nine tests conducted for the need for training in the competency areas ranged from .0 to .352.

As shown in Figure 8 and the per item scores in Table 20, college faculty, technical officer and senior technical officer respondents in general indicated the need for training of technical officers in the nine competency areas. However, senior technical officers felt less need than technical officers and faculty of college for the training of technical officers in the areas of effective thinking, technical subject matter and research and evaluation.

The question on when training in the nine competency areas should be given yielded a significant difference between the populations. The extension organization and administration area yielded an F of 12.66 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted revealed a significant difference between college ($\bar{x} = 16.83$) and technical officer ($\bar{x} = 18.72$) populations, there was however no significant difference between college and senior technical officer ($\bar{x} = 17.23$) populations.



DIFFERENCES BETWEEN FACULTY OF AGRICULTURAL COLLEGE, TECHNICAL OFFICER AND SENIOR TECHNICAL OFFICER POPULATIONS (BY POPULATION MEANS) ON THE NEED FOR TRAINING IN THE NINE COMPETENCY AREAS.

FIGURE 8

Table 20.--Analysis of Variance for Faculty of College, Technical Officer and Senior Technical Officer Populations with Respect to the Need for Training in the Nine Competency Areas.

	College (COL)			Technical Officer (TO)			Senior Technical Officer (STO)			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	$\bar{x}$			$\bar{x}$			$\bar{x}$										
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD						1	2	3
Extension Organization and Administration	7.33	.92	1.55	7.42	.93	1.36	7.92	.99	.28	5.15	1.63	2,304	3.16	.044			
Human Development	9.33	.93	1.55	9.06	.90	1.89	9.77	.98	.72	10.21	3.01	2,304	3.40	.035	TO, COL	COL, STO	
Educational Process	9.12	.91	2.33	9.14	.91	2.04	9.73	.97	.87	7.15	3.72	2,304	1.92	.148			
Social Systems	9.54	.95	1.32	9.22	.92	1.79	9.73	.97	1.12	5.64	2.80	2,304	2.01	.135			
Program Planning and Development	11.12	.93	2.83	11.22	.93	2.13	11.69	.97	1.35	4.61	4.40	2,304	1.05	.352			
Communication	9.12	.91	2.42	9.48	.95	1.46	9.81	.98	.79	4.07	2.17	2,304	1.87	.155			
Effective Thinking	8.17	.91	2.12	8.31	.92	1.39	5.64	.63	1.14	142.57	2.02	2,304	70.52	.000	STO	COL, TO	
Technical Knowledge	36.79	.94	5.24	36.95	.95	4.66	19.73	.50	3.44	5996.63	20.64	2,304	290.56	.000	STO	COL, TO	
Research and Evaluation	8.92	.89	2.68	9.65	.96	1.10	6.00	.60	0	265.18	1.48	2,304	179.34	.000	STO	COL	TO

Scale: 0 - Not Needed
1 - Needed

The question on when training should be given in the human development area yielded an F of 6.13 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between college ($\bar{x} = 20.67$) and technical officer ($\bar{x} = 22.84$) populations, but no significant difference between college and senior technical officer ($\bar{x} = 20.85$) populations.

The question on when training should be given in the educational process area yielded an F of 6.97 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences showed a significant difference between college ($\bar{x} = 20.21$) and technical officer ($\bar{x} = 22.22$) populations but no significant difference between college and senior technical ($\bar{x} = 20.67$) populations.

The question on when training should be given in the social systems area yielded an F of 7.22 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences showed a significant difference between college ($\bar{x} = 22.37$) and technical officer ($\bar{x} = 24.95$) populations but no significant difference between college and senior technical officer ($\bar{x} = 23.37$) populations.

The question on when training should be given in the program planning and development area yielded an F of

14.21 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer ($\bar{x}$ = 26.60) and technical officer ($\bar{x}$ = 29.99) populations but no significant difference between senior technical officer and college ($\bar{x}$ = 27.25) populations.

The question on when training should be given in the communication area yielded an F of 11.58 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences showed a significant difference between college ($\bar{x}$ = 21.33) and technical officer ($\bar{x}$ = 23.63) populations but no significant difference between college and senior technical officer ($\bar{x}$ = 21.42) populations.

The question on when training should be given in the effective thinking area yielded an F of 133.99 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences showed a significant difference between the three populations--senior technical officer ($\bar{x}$ = 12.42), college ($\bar{x}$ = 19.46) and technical officer ($\bar{x}$ = 21.53).

The question on when training should be given in the technical knowledge area yielded an F of 157.07 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences

showed a significant difference between the three populations--senior technical officer ($\bar{x}$ = 60.10), college ($\bar{x}$ = 79.33) and technical officer ($\bar{x}$ = 23.15).

The question on when training should be given in the research and evaluation area yielded an F of 9.46 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer ($\bar{x}$ = 21.37) and technical officer ($\bar{x}$ = 23.15) populations but no significant difference between senior technical officer and college ($\bar{x}$ = 21.54) populations.

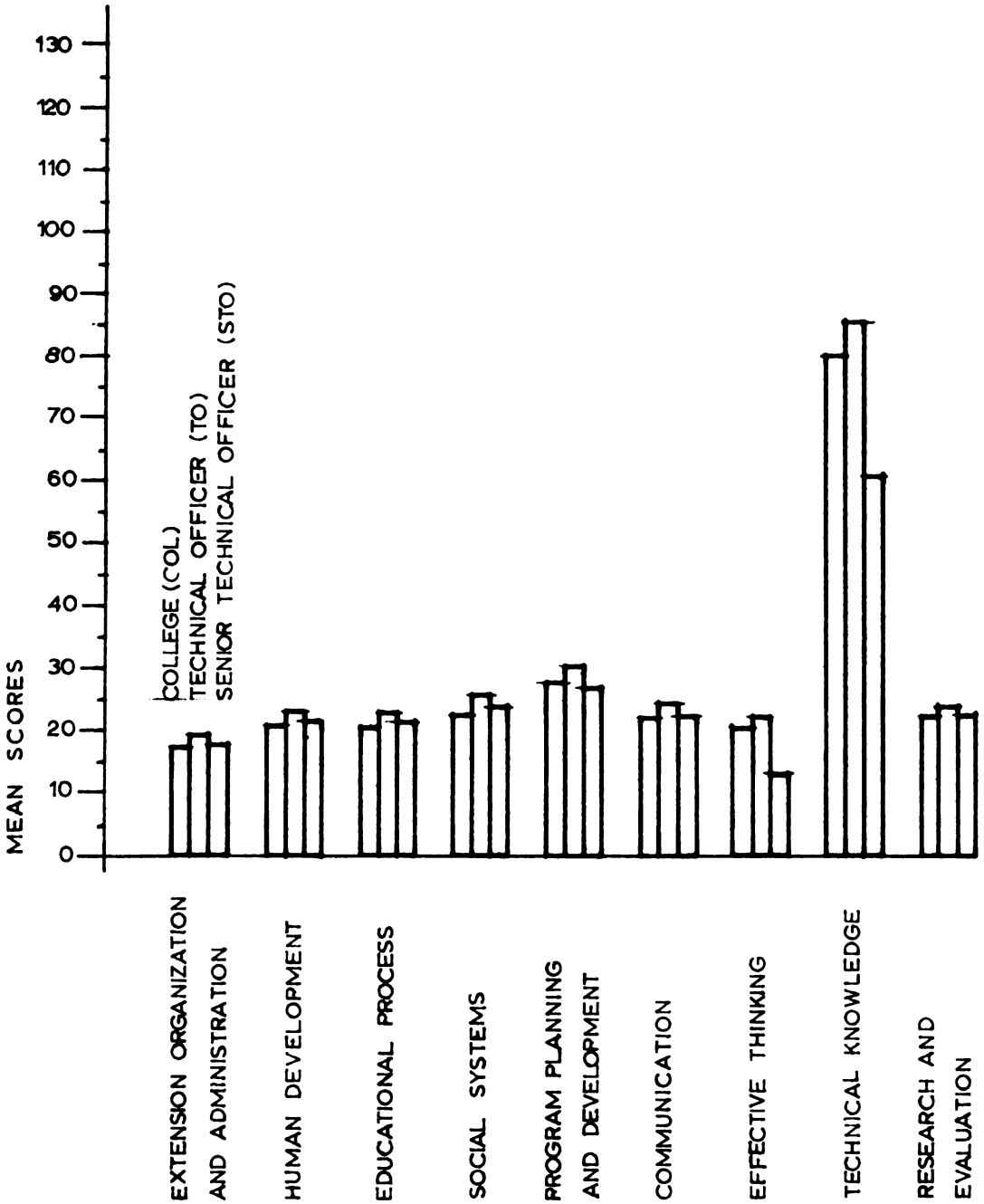
The null hypothesis of no difference between the populations in the case of when training should be given in the nine competency areas was rejected. The alternative hypothesis of difference between the population on when training should be given was accepted. The probability of the differences between the college, technical officer and senior technical officer populations arising by chance for the nine tests conducted ranged from .0 to .002.

Per item scores in Table 21 and the graphic presentation in Figure 9 revealed that in general, respondents indicated that training in the nine competency areas should be given in agricultural colleges. However, Senior Technical Officers indicated that training in the areas of effective thinking and technical subject matter should be

Table 21.--Analysis of Variance for Faculty of College, Technical Officer and Senior Technical Officer Populations in Respect to When Training Should be Given in the Nine Competency Areas.

	College (COL)			Technical Officer (TO)			Senior Technical Officer (STO)			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	$\bar{x}$			$\bar{x}$			$\bar{x}$										
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD						1	2	3
Extension Organization and Administration	16.83	2.10	1.49	18.72	2.34	2.56	17.23	2.15	1.96	73.75	5.83	2,304	12.66	.000*	COL, STO	TO	
Human Development	20.67	2.07	2.24	22.84	2.28	4.56	20.85	2.08	3.99	115.71	18.88	2,304	6.13	.002*	COL, STO	TO	
Educational Process	20.21	2.02	1.02	22.22	2.22	3.72	20.67	2.07	2.61	82.01	11.77	2,304	6.97	.001*	COL, STO	TO	
Social Systems	22.37	2.24	3.35	24.95	2.50	3.93	23.37	2.34	3.81	108.24	15.00	2,304	7.22	.001*	COL, STO	TO	
Program Planning and Development	27.25	2.27	3.97	29.99	2.50	4.67	26.60	2.22	3.40	281.36	19.80	2,304	14.21	.000*	STO, COL	TO	
Communication	21.33	2.13	2.18	23.63	2.36	3.70	21.42	2.14	2.62	138.44	11.95	2,304	11.58	.000*	COL, STO	TO	
Effective Thinking	19.46	2.16	2.48	21.53	2.39	3.82	12.42	1.38	2.08	1657.37	12.37	2,304	133.99	.000*	STO	COL	TO
Technical Knowledge	79.33	2.03	5.72	84.71	2.17	9.70	60.10	1.54	3.56	12082.81	76.93	2,304	157.07	.000*	STO	COL	TO
Research and Evaluation	21.54	2.15	2.24	23.15	2.31	3.15	21.37	2.14	1.99	81.99	8.66	2,304	9.46	.000*	STO, COL	TO	

Scale: 1 - Before College
2 - In College
3 - After College



DIFFERENCES BETWEEN FACULTY OF AGRICULTURE COLLEGE, TECHNICAL OFFICER AND SENIOR TECHNICAL OFFICER POPULATIONS (BY POPULATION MEANS) ON WHEN TRAINING SHOULD BE GIVEN IN THE NINE COMPETENCY AREAS.

FIGURE 9

given before technical officers are admitted to agricultural colleges. Technical officers preferred training in social systems and program planning and development to be given after college.

The null hypothesis of no difference between technical officer population and senior technical officer population in the degree of competence possessed by technical officers was rejected, and the alternative hypothesis of difference between the two populations in the degree of competence possessed by technical officers in the nine competency areas was accepted.

The question on the degree of competence possessed by technical officers in the human development competency area yielded an F of 4.50 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons were conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x} = 28.69$) and technical officer population ($\bar{x} = 31.77$).

The question on the degree of competence possessed by technical officers in the educational process competency area yielded an F of 6.78 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x} = 29.62$) and technical officer population ($\bar{x} = 33.43$).

The question on the degree of competence possessed by technical officers in the social systems competency area yielded an F of 4.12 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x} = 30.75$) and technical officer population ($\bar{x} = 33.54$).

The question on the degree of competence possessed by technical officers in the program planning and development competency area yielded an F of 6.03 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x} = 35.85$) and technical officer population ($\bar{x} = 40.19$).

The question on the degree of competence possessed by technical officers in the communication competency area yielded an F of 12.47 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x} = 29.21$) and technical officer population ($\bar{x} = 34.48$).

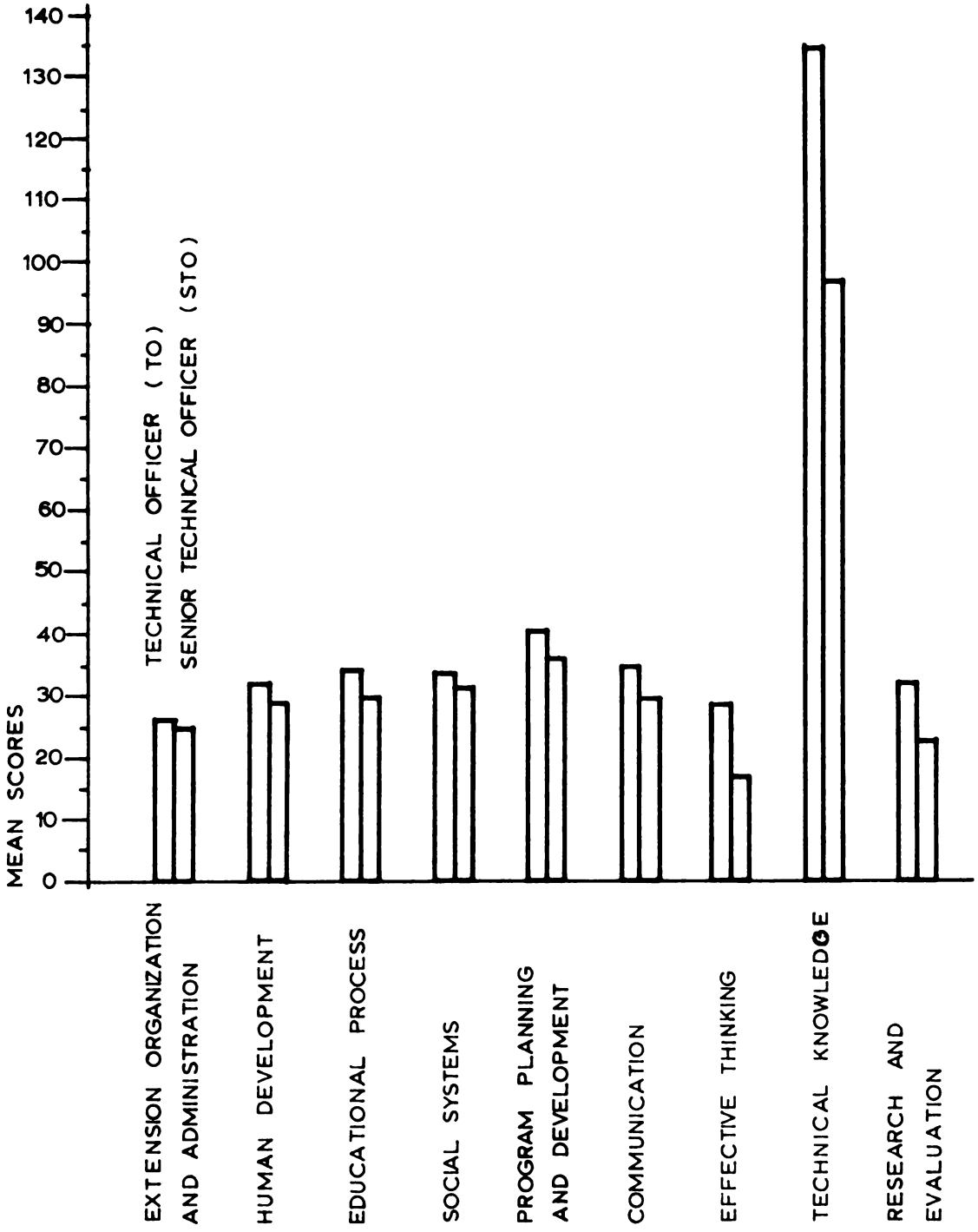
The question on the degree of competence possessed by technical officers in the effective thinking competency area yielded an F of 87.80 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons

conducted to test pairwise differences, revealed a significant difference between senior technical officer population ($\bar{x}$ = 16.50) and technical officer population ($\bar{x}$ = 27.80).

The question on the degree of competence possessed by technical officers in the technical knowledge competency area yielded an F of 79.61 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x}$ = 96.73) and technical officer population ($\bar{x}$ = 134.34).

The question on the degree of competence possessed by technical officers in the research and evaluation competency area yielded an F of 41.30 which with a df = 1,281 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officer population ($\bar{x}$ = 22.17) and technical officer population ($\bar{x}$ = 31.49). The probability of the differences between the senior technical officer and technical officer populations arising by chance for the nine tests conducted ranged from .0 to .082.

A representation of the degree of competence possessed by technical officers in the nine competency areas as indicated by technical officers and senior technical officers is shown in Figure 10. Observation of the



DIFFERENCES BETWEEN TECHNICAL OFFICER AND SENIOR TECHNICAL OFFICER POPULATIONS (BY POPULATION MEANS) ON THE DEGREE OF COMPETENCE POSSESSED BY TECHNICAL OFFICERS IN THE NINE COMPETENCY AREAS.

FIGURE 10

graphic illustration and the per item scores in Table 22 revealed that technical officers indicated that they possessed an average degree of competence in all the nine competency areas. Senior technical officers on the other hand indicated that technical officers working under them possessed an average degree of competence in the areas of extension organization and administration, human development, educational process, social systems, program planning and development and communication; and low degree of competence in effective thinking, technical knowledge and research and evaluation.

The degree of importance of the extension organization and administration competency area yielded an F of 44.83 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between technical officer ($\bar{x} = 1.28$) and senior technical officer ($\bar{x} = 2.00$) populations, but no significant difference between technical officer and college ($\bar{x} = 1.46$) populations.

The question on how important the human development competency area was yielded an F of 21.98 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons showed a significant difference between senior technical officer ($\bar{x} = 1.00$) and technical officer ($\bar{x} = 1.53$)

Table 22.--Analysis of Variance for Technical Officer and Senior Technical Officer Populations with Respect to the Degree of Competence Possessed by Technical Officers in the Nine Competency Areas.

	Technical Officer (TO) $\bar{x}$			Senior Technical Officer (STO) $\bar{x}$			MS Between	MS Within	df	F	P	Tukey Post Hoc Subsets		
	Raw Score	Per Item Score	SD	Raw Score	Per Item Score	SD						1	2	3
Extension Organization and Administration	25.89	3.24	6.60	24.02	3.0	7.52	139.16	45.79	1,281	3.04	.082			
Human Development	31.77	3.21	9.04	28.69	2.87	9.78	377.74	84.05	1,281	4.50	.035	STO	TO	
Educational Process	33.43	3.34	9.12	29.62	2.96	9.72	577.01	85.07	1,281	6.78	.010	STO	TO	
Social Systems	33.54	3.35	8.39	30.75	3.07	10.02	310.36	75.40	1,281	4.12	.043	STO	TO	
Program Planning and Development	40.19	3.35	10.64	35.85	2.99	13.38	748.36	124.14	1,281	6.03	.015	STO	TO	
Communication	34.48	3.45	9.07	29.21	2.92	11.05	1109.84	89.02	1,281	12.47	.000	STO	TO	
Effective Thinking	27.80	3.09	7.84	16.50	1.83	6.35	5089.55	57.97	1,281	87.80	0	STO	TO	
Technical Knowledge	134.34	3.44	28.40	96.73	2.48	14.79	56371.57	708.09	1,281	79.61	0	STO	TO	
Research and Evaluation	31.49	3.15	9.50	22.17	2.22	7.24	3467.38	83.95	1,281	41.30	0	STO	TO	

Scale: $\frac{1}{2}$ - Low Competence 3 - Average Competence $\frac{4}{5}$ - High Competence

populations, but no significant difference between technical officer and college ($\bar{x}$ = 1.50) populations.

The question on the importance of the educational process competency area yielded an F of 167.80 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences showed a significant difference between the technical officer population ($\bar{x}$ = 1.22) and the senior technical officer population ($\bar{x}$ = 2.98) but no significant difference between technical officer and college ($\bar{x}$ = 1.25) populations.

The question on the importance of social systems competency area yielded an F of 19.64 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between college population ($\bar{x}$ = 1.29) and senior technical officer population ($\bar{x}$ = 2.10) but no significant difference between college and technical officer ($\bar{x}$ = 1.48) populations.

The question on the importance of the program planning and development competency area yielded an F of 3.68 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences showed a significant difference between the senior technical officer population ($\bar{x}$ = 1.00) and the technical officer population ($\bar{x}$ = 1.18) but no significant

difference between either senior technical officer or technical officer and college ($\bar{x}$ = 1.12) populations.

The question on the importance of the communication competency area yielded an F of 150.96 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between the college population ($\bar{x}$ = 1.12) and the senior technical officer population ($\bar{x}$ = 3.04) but no significant difference between college and technical officer ($\bar{x}$ = 1.26) populations.

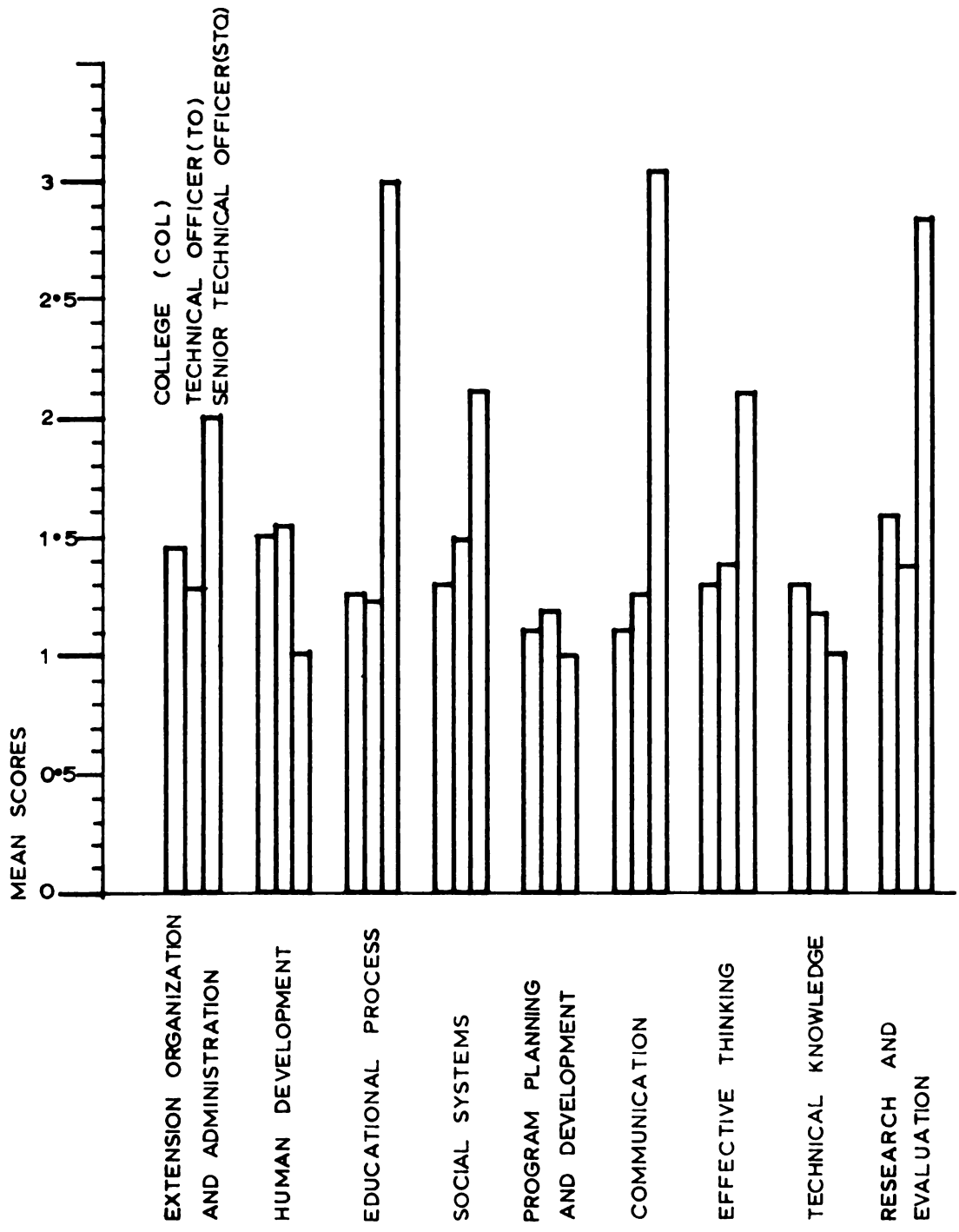
The question on the importance of the effective thinking competency area yielded an F of 45.25 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between college population ($\bar{x}$ = 1.29) and senior technical officer population ($\bar{x}$ = 2.10) populations but no significant difference between college and technical officer ($\bar{x}$ = 1.36) populations.

The question on the importance of the technical knowledge competency area yielded an F of 5.53 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between senior technical officers population ($\bar{x}$ = 1.00) and college population ($\bar{x}$ = 1.29) but no significant difference between college and technical officer ($\bar{x}$ = 1.17) populations.

The question on the importance of the research and evaluation competency area yielded an F of 50.77 which with a df = 2,304 was significant at $p < .05$. Tukey post hoc comparisons conducted to test pairwise differences revealed a significant difference between the technical officer population ($\bar{x} = 1.37$) and the senior technical officer population ($\bar{x} = 2.83$) but no significant difference between the technical officer and the college ($\bar{x} = 1.58$) populations.

The hypothesis of no difference between college, senior technical officer, and technical officer populations in their perceived degree of importance of the nine competency areas was rejected and the alternative hypothesis of difference between the population was accepted. The probability of the differences between the three populations arising by chance for the nine tests conducted ranged from .000 to .026.

As shown in Figure 11 and in Table 23 faculty of agricultural colleges and technical officers indicated that all the nine competency areas were important to be included in the training program for beginning technical officers. Senior technical officers on the other hand indicated that the areas of extension organization and administration, educational process, social systems, communication, effective thinking and research and evaluation were very important and the areas of human development, program



DIFFERENCES BETWEEN FACULTY OF AGRICULTURAL COLLEGE, TECHNICAL OFFICER AND SENIOR TECHNICAL OFFICER POPULATIONS (BY POPULATION MEANS) ON THE IMPORTANCE OF THE NINE COMPETENCY AREAS.

FIGURE 11

Table 23.--Analysis of Variance for Faculty of College, Technical Officer and Senior Technical Officer Populations with Respect to the Importance of the Nine Competency Areas.

Competency Areas (Content Areas)	College (COL)		Technical Officer (TO)		Senior Technical Officer (STO)		MS Between	MS Within	df	F	P	Subsets 1	Subsets 2	Subsets 3
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S								
Extension Organization and Administration	1.46	.59	1.28	.49	2.00	.36	10.47	.23	2,304	44.83	.000*	TO, COL	STO	
Human Development	1.50	.51	1.53	.56	1.00	0	5.68	.26	2,304	21.98	.000*	STO	COL, TO	
Educational Process	1.25	.44	1.22	.48	2.98	1.08	62.11	.37	2,304	167.80	.000*	TO, COL	STO	
Social Systems	1.29	.46	1.48	.73	2.10	.31	8.79	.45	2,304	19.64	.000*	COL, TO	STO	
Program Planning and Development	1.12	.34	1.18	.47	1.00	.21	.67	.18	2,304	3.68	.026*	STO, COL	COL TO	
Communication	1.12	.34	1.26	.52	3.04	1.18	65.40	.43	2,304	150.96	.000*	COL, TO	STO	
Effective Thinking	1.29	.55	1.36	.51	2.10	.42	11.52	.25	2,304	45.25	.000*	COL, TO	STO	
Technical Knowledge	1.29	.62	1.17	.40	1.00	0	.86	.16	2,304	5.53	.004*	STO	TO, COL	
Research and Evaluation	1.58	.72	1.37	.86	2.83	1.23	42.92	.84	2,304	50.77	.000*	TO, COL	STO	

Scale: 0 - Not Important
1 - Important
2 - Very Important

planning and development and technical knowledge were important to be included in the pre-service training program for technical officers.

Summary of the Findings

A summary of the decision rule for eliminating spuriously rejected hypothesis is presented in Table 24. An alpha of 0.05 was set for rejection of each null hypothesis.

The following were the major findings revealed by an analysis of data presented in this chapter:

1. Technical officers, senior technical officers and faculty of the three agricultural colleges in Ghana felt that the pre-service training program of technical officers should include the nine competency areas of:
   a. Extension organization and administration.
   b. Human development.
   c. Educational process.
   d. Social systems.
   e. Program planning and development.
   f. Communication.
   g. Effective thinking.
   h. Technical knowledge.
   i. Research and evaluation.

Table 24.--Decision Rule for Eliminating Spuriously Rejected Hypotheses.

	College		Technical Officers						Senior Technical Officers		Comparison 3 Populations	
			Tenure		College		Region					
	# sig	# tests	# sig	# tests	# sig	# tests	# sig	# tests	# sig	# tests	# sig	# tests
Need for Training	0	9	0 Hypothesis Not Rejected	9	1	9	2	9			5	9
When Training Should Be Given	0	9	6 Hypothesis Rejected (Interpret)	9	0	9	2	9			9	9
Competence Possessed			3 Hypothesis Rejected (Interpret)	9	0	9	1	0			8	9
Importance of Competency Areas	0	9	2 Hypothesis Rejected (Interpret	0	1	9	2	9			9	9
TOTAL	0	27	11	36	2	36	7	36			31	36
Expected to Achieve Significance by Change	1 Hypothesis Not Rejected		2 Hypothesis Rejected Interpret		2 Hypothesis Rejected		2 Hypothesis Rejected Interpret				2 Hypothesis Rejected Interpret	

TOTAL 20 significant out of 108

Number Expected by Chance 5

2. There was in general a high correlation in when training in the nine competency areas should be offered between tenure groups, college groups and regional groups within the technical officers population; between the three college groups and the senior technical officer group. Respondents felt that training in the nine competency areas should be given in agricultural colleges.
3. Technical officers of the three tenure groups, three college groups and eight regional groups felt they possessed an average degree of competence in the nine competency areas.
4. Senior technical officers felt that technical officers working under their supervision possessed below average degree of competence in effective thinking, technical subject matter and research and evaluation competency areas.
5. There was in general a high correlation in the perceived importance of the nine competency areas in the training program for technical officers between tenure groups, college groups and regional groups within the technical officer population; between the three college groups and the senior technical officer population. Respondents felt that the nine competency areas were important to be included in technical officer training program.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

The general purpose of this study was to determine the pre-service training needs of agricultural extension officers (technical officers) in Ghana as reflected by the reaction of (1) extension officers in the field, (2) senior technical officers under whom the extension officers work, and (3) the faculty of the three agricultural colleges responsible for the training of extension officers.

The study was designed to include the following nine competency areas identified through a review of literature as areas in which agricultural extension officers should possess competence. The areas were:

1. Extension organization and administration.
2. Human development.
3. Educational process.
4. Social systems.
5. Program planning and development.
6. Communication.
7. Effective thinking.

8. Technical knowledge.

9. Research and evaluation.

The nine competency areas of the questionnaire were divided into four sections. Section I.--Respondents were asked to indicate as to whether beginning extension officers need to or not need to possess competence in the nine competency areas. Section II.--Technical officer respondents were asked to indicate the degree of competence they possessed in the nine competency areas. Technical officers could indicate their degree of competence on a five-point scale--"1" being low degree of competence and "5" being high degree of competence possessed. Section III.--Respondents were asked to indicate their opinion on when training in the nine competency areas should be given to technical officers. They could indicate whether it should be given before college, in college or after college. Section IV dealt with the degree of importance of the areas to the effectiveness of an extension officer. Respondents were asked to indicate their opinion of the degree of importance as very important, important or not important.

Three basic assumptions relative to the pre-service training needs of agricultural extension officers in Ghana were made. These were:

1. that agricultural extension officers in Ghana could be made more effective by sound

pre-service training in the nine competency areas;

2. that practicing agricultural extension officers, their supervisors and faculty of the three agricultural colleges in Ghana were capable of providing useful information on pre-service training needs of agricultural extension officers in Ghana; and
3. that the findings of this study could be used as a basis for curriculum reform in the agricultural colleges in Ghana.

It is the considered view of the writer that it was necessary to point out the limitations of the study.

1. The study was limited to an attempt to identify the pre-service training needs essential for a successful extension officer.
2. The focus of the study was on nine competency areas considered to be essential to an extension officer for a successful entry into extension work.
3. The study did not attempt to evaluate the present pre-service training programs in the agricultural colleges in Ghana and did not attempt to evaluate the present government policies on agricultural personnel training.

4. The study was limited to descriptions of the Ghana Government agricultural policies, pre-service training programs of the agricultural training colleges in Ghana and competency areas identified by practicing agricultural extension officers, their supervisors and faculty of agricultural colleges as being important to be included in pre-service training progress for agricultural extension officers.

The data for this study was obtained from 240 technical officers which were fifty percent of technical officer population in the eight regions covered in Ghana, 48 senior technical officers which were fifty five percent of senior technical officer population in the eight regions and the total population of 24 faculty members of the three agricultural colleges in Ghana.

Questionnaires based upon nine competency areas identified through the review of literature related to the training needs of agricultural extension officers were constructed and administered by the writer and two research assistants.

Data collected for the study were coded and key-punched onto computer cards and analyzed. Each content area subtest for each major scale was scored by adding the values for each item response of items defined as falling within the subtest. The hypotheses for differences

within technical officer groups--tenure, college attended and region of work within faculty of agricultural colleges group--Kwadaso, Nyankpala and Ohawu; and hypotheses for differences between technical officer, senior technical officer and faculty of agricultural college populations were tested with one-way analysis of variance. Tukey post hoc procedures were used to isolate pairwise differences wherever the omnibus F Ratio was significant at alpha = .05.

Pre-Service Training Needs of Ghananian Agricultural Extension Officers

Comparisons made between agricultural extension officer tenure groups, college attended groups and regional groups in the need for training in the nine competency areas revealed that the pre-service training program for agricultural extension officers in Ghana should include the areas of extension organization and administration, human development, educational process, social systems, program planning and development, communication, effective thinking, technical subject matter and research and evaluation. The extension officers indicated that the nine competency areas were important to the overall effectiveness of extension officers and that they received their training in the areas in the agricultural colleges.

Extension supervisors and faculty of the three agricultural colleges in Ghana also indicated the need for training of extension officers in the nine areas. They also rated the areas as important and indicated that the greater part of training in the areas should be given at the agricultural colleges.

Extension Officers by Tenure Groups

The data were analyzed according to the three tenure groups (1) 2-5 years, (2) 6-9 years, and (3) 10 years and above. All the groups indicated that beginning agricultural extension officers need to possess competence in the nine competency areas. The 10 years plus group indicated a high degree of competence in the nine areas and the 2-5 years and 6-9 years groups indicated an average degree of competence in the areas. All the groups indicated that they had training in the areas in agricultural colleges. The 2-5 years and 10 years plus groups rated the areas of extension organization and administration, human development, educational process, social systems, program planning and development, communication, effective thinking and technical knowledge as very important to the effectiveness of an agricultural extension officer. The 6-9 years group rated all the nine areas as important.

Extension Officers by College Groups

Data were analyzed according to the three agricultural colleges attended by extension officers. The three colleges (1) Kwadaso, (2) Nyankpala, and (3) Ohawu are responsible for the training of agricultural extension officers in Ghana. All groups indicated that beginning extension officers need to have competence in the nine areas; that respondents in the groups possessed an average degree of competence in the areas; and that training in the areas was received in the three agricultural colleges. The three groups also rated the nine areas as important to the overall effectiveness of an agricultural extension officer.

Extension Officers by Regional Groups

Data were analyzed according to the eight regions covered by the study. The regions were (1) Greater Accra, (2) Ashanti, (3) Western, (4) Central, (5) Volta, (6) Brong Ahafo, (7) Eastern, and (8) Northern. All the groups indicated that beginning agricultural extension officers need to possess competence in the nine competency areas. Extension officers working in Ashanti, Western and Eastern Regions indicated that they possessed a high degree of competence in the nine areas. Extension officers in Greater Accra, Central, Volta, Brong Ahafo and Northern

regions indicated that they possessed an average degree of competence in the nine areas of training. Extension officers in all the eight regional groups indicated that they received training in the nine areas in agricultural colleges. Extension officers in Greater Accra, Ashanti and Volta regions rated the areas of human development, social systems and research and evaluation as very important and the other six areas as important to be included in the pre-service training program for agricultural extension officers. The remaining five regional groups indicated that the nine areas were important to be included in the pre-service training program.

Senior Technical Officers

Senior technical officers indicated that beginning technical officers need to be competent in the nine competency areas. They also indicated that the nine areas were important to be included in pre-service training program for extension officers. Training in the areas should be the responsibility of the agricultural colleges. The senior technical officers indicated that technical officers who worked under them possessed below average degree of competence in some of the nine training areas.

Faculty of Agricultural College Groups

Data were analyzed according to the three faculty groups: (1) Kwadaso, (2) Nyankpala, and (3) Ohawu. The

three faculty groups indicated that beginning extension officers need to be competent in the nine areas of training and that such a training should be given by the agricultural colleges. Kwadaso and Ohawu faculty groups found the areas of extension organization and administration, human development, educational process and social systems very important; Nyankpala faculty group on the other hand found these areas important to be included in the pre-service training program for extension officers. The areas of technical knowledge, research and evaluation were found by Kwadaso and Nyankpala to be very important. The other competency areas of program planning and development, communication and effective thinking were found to be important by all the three faculty groups.

Conclusions

1. When faculty of agricultural college groups were compared, there was a general agreement that it was important for a beginning agricultural extension officer to be competent in the nine competency areas; that the nine areas should be included in the pre-service training program and that training in the areas should be the responsibility of the agricultural colleges.
2. When agricultural extension officers were compared by college groups, there was the indication that the competency areas were important, that extension

officers need to have knowledge about them and that the competence possessed in the areas was acquired at the agricultural colleges.

3. When the opinions of agricultural extension officers were compared by tenure groups, there was the general agreement that the nine competency areas were important to be included in the pre-service training program; that beginning extension officers need to have competence in the areas and that the competence possessed in the areas by serving extension officers was acquired at the agricultural colleges. The 10-year tenure group indicated a higher degree of competence in the nine competency areas over the 2-5 years and 6-9 years tenure groups. This difference could be attributed to the longer length of service and field experience of the respondents in the 10-year group. This seemed to indicate that the longer the length of service and the more the field experience acquired, the more an extension officer felt he was competent in extension work.
4. When agricultural extension officers were compared by regions, there was the general agreement that beginning agricultural extension officers need to have competence in the nine competency areas and that the areas need to be included in the pre-service training program for prospective

agricultural extension officers. The higher degree of competence in the nine competency areas indicated by respondents in Ashanti, Western and Eastern regions over respondents in the other regions, could be attributed to differences in the degree of field experience acquired by respondents in the various regions.

The regional differences shown in the degree of importance and the degree of competence extension officers possessed in the nine competency areas should be considered when in-service training programs are being drawn for serving agricultural extension officers.

5. Senior technical officers indicated that the nine competency areas were important to be included in the pre-service training programs for agricultural extension officers. They also indicated that extension officers need training in the areas and that such a training should be the responsibility of the agricultural colleges. In the opinion of the senior technical officers, extension officers working under them had a below average degree of competence in the competency areas. This led me to believe that serving extension officers need training in the nine competency areas through in-service.

6. When the three populations (1) agricultural extension officers, (2) agriculture extension supervisors, and (3) faculty of the three agricultural colleges were compared there was a disagreement in respect to the need for extension officer training in the areas of effective thinking, technical subject matter and research and evaluation. There were also differences on when training should be given in the areas of effective thinking, technical subject matter, social systems and program planning and development. The three populations also differed in the perceived degree of importance of the areas of extension organization and administration, educational process, social systems, communication, effective thinking, technical subject matter, human development and research and evaluation.

The differences between the groups showed that though they were all involved in extension work, they could not agree on the type of training that should be given to prospective agricultural extension officers and those already engaged in extension work. The findings of this study should enable all the groups involved in extension work to come together to develop a more compatible training program for agricultural extension officers.

7. Findings reported in this study closely paralleled those found in previous studies on the training needs of agricultural extension officers in the United States, Canada, Nigeria, and Tanzania. This might be due to the fact that agricultural extension means the same thing wherever it is practiced--helping the farmer improve his farming methods and thereby increasing his production and income. The findings indicated that if agricultural extension was to achieve its goal of getting mass acceptance of improved agricultural methods for increased production, then agricultural extension officers in charge of farmer education required special knowledge of competence in the broad training areas of (1) extension organization and administration, (2) human development, (3) educational process, (4) social systems, (5) program planning and development, (6) communication, (7) effective thinking, (8) technical subject matter, and (9) research and evaluation.

If agricultural production is to keep pace with population increase in Ghana as it is in the United States, then extension officers should be given the type of training that would enable them to work more effectively with the farmers.

Recommendations

1. The pre-service training program for agricultural extension officers in Ghana should be reviewed in light of the findings of this study.
2. There should be constant assessment of what extension officers are taught in relation to what they are expected to do after training.
3. Extension training should not be a once and for all exercise. Extension should keep in line with change. This means there must be a provision for a continuous in-service training. Intensive in-service training is a necessity for extension officers now working in the field. This will help improve their competence in the competency areas identified in this study.
4. In-service training should be provided to all agricultural extension officers in all the nine competency areas, more specifically in the areas of research and evaluation, effective thinking, human development and technical subject matter.
5. There is need for induction training for beginning agricultural extension officers. Induction training should give them a clear understanding of agricultural extension policies, objectives and philosophy. This training should be considered as a supplement to what the extension officers have

learned in the agricultural colleges. The induction training programs should be systematic and well organized so as to arouse the interest of serving extension officers.

6. As extension does not only bring about technological change but also social and attitudinal changes in rural people, prospective candidates must have rural background or farming experience and must exhibit the ability to identify themselves with the aspirations of the rural people. Training in the social sciences and human development are necessary.
7. Research should be conducted to determine the effects of the following on-the-job performance of the Ghananian agricultural extension officer: (1) transportation, (2) opportunity for further studies, (3) salaries, and (4) promotion and other conditions of service.
8. A training policy for the training of agricultural extension personnel should be established by the Ministry of Agriculture. The policy making body should set training goals, develop facilities for training, see to the financing of training programs and see to it that continuous evaluation of training programs is carried out.

9. Agricultural colleges should be made efficient by staffing them with qualified faculty capable of teaching the identified competency areas effectively.
10. As the effective functioning of an organization like the Ghana Agricultural Extension Service depends upon well-trained personnel at all levels in the organization, research should be conducted for the purpose of identifying training needs of extension supervisors and administrators. This study was limited to the training needs of agricultural extension officers.

APPENDICES

APPENDIX A

APPENDIX A

MINISTRY OF AGRICULTURE

Vacancies for
Learner Technical Officers
(Agriculture)

Kwadaso, Nyankpala and Ohawu
Agricultural Colleges

Applications are invited from suitably qualified persons to undergo a three-year course of training beginning February 1, 1977 at the Agricultural Colleges at Kwadaso, Nyankpala and Ohawu.

2. QUALIFICATIONS:

Candidates must:

(a) be citizens of Ghana

(b) be between the ages of 18 and 25 years and

(c) possess the West African School Certificate or a General Certificate of Education at Ordinary Level with passes in five subjects, including English Language, Elementary Mathematics and either General Science or Agricultural Science, or

(d) possess the Intermediate City and Guilds Certificate in Agricultural Mechanics

(e) candidates for the June 1976 GCE or West African School Certificate Examination may apply on producing satisfactory evidence that they have entered for the examination in the required subjects.

Preference will be given to candidates who at the time of selection are qualified under paragraph 2 (c & d) above.

A limited number of vacancies exist at Kwadaso Agricultural College for female learners who will, in addition to agriculture, take courses in Home Science.

3. Suitable applicants who will be selected after an examination and interview will qualify for entry to the Agricultural Colleges. Candidates selected for training must have a certificate of fitness from a Government Medical Officer before accepted for training.

4. ALLOWANCES:

Learners will be paid allowances at the following rates:

1st Year	948.00 per annum
2nd Year	984.00 per annum
3rd Year	1020.00 per annum

5. Furnished accommodation and services are provided at the colleges at a low charge. Learners are also required to pay for the cost of messing.

6. BOND: Learners will be bonded for 500.00 to complete the course and to serve for five years in any subsequent appointment in the Ministry of Agriculture.

7. Learners who successfully complete the course will be eligible for appointment as Technical Officer (Agriculture) on the salary scale R. 35, 42, i.e.

1428 x 48 -- 1620: 1788 x 60 -- 2028

PROSPECTS: Technical Officer (Agriculture) has prospects of promotion to the grade of Senior Technical Officer R. 47, 52 (2,100 -- 2,808.00 p.a.), Principal Technical Officer R. 57, 62 (2,904.00 -- 3,864.00 p.a.) and Chief Technical Officer R. 67, 72, 74 (3,984 -- 5,520.00 p.a.).

8. METHOD OF APPLICATION:

Official application forms can be obtained on request from the DIRECTOR OF AGRICULTURE, P.O. BOX M.37, ACCRA. Completed application forms accompanied by

(a) two passport size photographs

(b) self-addressed envelope affixed with 7p stamp

(c) an examination fee of FOUR CEDIS (4.00) POSTAL/MONEY ORDER which should be CROSSED and made payable to West African Examinations Council

must be despatched by registered post to reach the DIRECTOR OF AGRICULTURE, P. O. Box M.37, ACCRA not later than 6th APRIL, 1976. Applicants must write their name and address at the back of the postal or money order. Applications which are not accompanied by Postal/Money orders will be ignored.

NO LATE APPLICATIONS WILL BE CONSIDERED

Director of Agriculture

APPENDIX B

A SUMMARY OF THE STANDARDIZED AND HARMONIZED SYLLABUS FOR AGRICULTURAL COLLEGES IN GHANA

APPENDIX B

A SUMMARY OF THE STANDARDIZED AND HARMONIZED SYLLABUS FOR AGRICULTURAL COLLEGES IN GHANA

First Year

Botany

Objectives of the Botany course are that students after the course should be able to:

1. Understand the processes involved in plant growth.
2. Apply plant growth processes in crop production.
3. Understand nutrient needs of crops and the effect they have on plant growth.
4. Provide crop nutrient needs through application of manures and fertilizers.
5. Select the right type of soil for a vegetable garden.
6. Understand the essence of budding and grafting.

The items under Botany are:

(a) Introduction to Botany

(b) The Plant Kingdom

(c) The Plant Body

(d) The Root, Stem, Leaf, Flower, Seeds, and Fruits

(e) Propagation of Plants

(f) Layout of Garden and Nursery

(g) Establishment of Lawns and Hedges

Crop Protection

The crop protection course has the following objectives. Students should be able after the course to:

1. Have a basic idea about insect class and its place in the animal kingdom.
2. Appreciate the economic importance of insects and other diseases of crops.
3. Identify harmful insects and how to control them.
4. Identify symptoms of diseases on plants and to determine kind of disease.

Items to be treated under Crop Protection are:

(a) General introduction to plant diseases.

(b) Causes of plant diseases.

(c) The study of nematodes.

(d) Inanimate causes of diseases.

(e) General characteristics of a typical insect.

(f) Classification of insects.

(g) Methods of Pest Control.

(h) Insecticides, fungicides, nematicides--fumigants and weedkillers.

(i) Weeds and weed control.

Animal Husbandry

Objectives--Students after the course should have ability to:

1. Identify the functions of the principal systems.
2. Classify nutrients and their uses to the animal body.
3. Determine causes of diseases.
4. Treat simple fractures and snake bite.
5. Apply knowledge in breeding in the selection of animals.
6. Start a livestock farming project.

Course items:

(a) Definition and aim of livestock keeping.

(b) Factors to consider in establishing a livestock enterprise.

(c) Ecological and sociological factors which affect livestock production in Ghana and West Africa in general.

(d) Nutrition of livestock.

(e) Elementary anatomy and physiology.

(f) Principles of Genetics and Animal Breeding.

(g) Embryology--Development of Birds and Mammals.

(h) Health: diseases and their causes.

(i) Preventive Medicine.

(j) First Aid Principles.

Soil Science

Objectives--Students after the course should have the ability to:

1. Identify different types of rocks.
2. Understand the basic principles underlying the weathering of rocks.
3. Understand the relationship between plants and animals.
4. Identify the agents of soil formation.
5. Understand the relationship between plants and soils.
6. Recognize the effect of soil PH on plant growth.
7. Recognize the importance of soil microbes.
8. Describe the various layers in a soil profile.
9. Classify soils of Ghana.

Course Items:

(a) The importance of soil in agriculture.

(b) Rocks.

(c) Primary and secondary minerals.

(d) Weathering of rocks.

(e) Soils--properties, structure, and texture, temperature, PH, etc.

(f) Plants and their relationship to soils.

(g) Soil microbes; soil organic matter, soil survey and soil profile and sampling.

Meteorology

Objectives:

1. Students to become familiar with agricultural meteorological instruments and learn the working principles of the instruments.
2. Students to know the importance of the weather records to agriculture.

Course Item:

(a) The importance of meteorology to agriculture.

(b) Types of meteorological instruments.

(c) Recording readings in the note book.

(d) Meteorology and Civil Aviation.

(e) The World Meteorological Association--aims and objectives.

Agricultural Surveying

Objectives--Students should have the ability to:

1. Make accurate measurements by using the chain.
2. Read the Prismatic compass correctly.
3. Construct right angles with the chain.
4. Identify and solve problems in chain surveying.
5. Read maps and interpret them correctly.

Course Items:

(a) Measurement and calculation of areas.

(b) Instruments used in chain surveying.

(c) Compass Survey, Magnetic Variation, and Deviation; Bearing.

(d) Levelling instruments and their uses.

Agricultural Economics

Objectives--Students should have the ability to:

1. Identify the factors of production.
2. Combine these factors to yield a reasonable margin of profit.
3. Recognize the problems associated with marketing.
4. Identify demand supply curves and assign reasons for them.
5. Understand the concept of elasticity.

Course Items:

(a) Introduction to agricultural economics--Definition, scope, money, and currencies.

(b) Factors of production--land, labour, etc.

(c) Production, function, and the law of diminishing returns.

(d) Cost analysis.

(e) Risks and Uncertainties.

(f) Demand and supply.

(g) Development of a market economy.

(h) International Trade.

Agricultural Machinery

Objectives--After the course students should have the ability to:

1. Calculate areas.

2. Select the right type of tool for particular job.
3. Select, handle, and use tools correctly.
4. Identify farm tools.
5. Recognize and identify the fundamental principles involved in machines.
6. Construct simple farm structures.
7. Identify parts of simple machines, etc.

Course Items:

(a) Review of areas, temperature, and heat.
(b) Electricity--magnetism and conduction of electricity.
(c) Mechanics.
(d) Simple Machines.
(e) Metals.
(f) Workshop hand tools.
(g) Paints.
(h) Wood Working Tools.
(i) Materials and welding.
(j) Farm Power.
(k) Internal combustion engines.
(l) Engine Power Transmission.

Second Year Syllabus

The objectives of courses in the second year are almost the same as those of the first year except those of Agricultural Extension--Extension Education is not offered in the first year.

Crop Production and Protection

Course Items:

1. Climate and vegetation of Ghana.
2. Crops--their general botany, climatic and soil requirements, propagation, diseases and pest control, weed control, harvesting, and marketing.
3. Crops to be treated--maize, rice, guinea corn, millet, yam, cassava, cowpeas, etc. (food crops, cash crops).

Animal Husbandry

Course Items:

1. The importance of Poultry Industry.
2. Poultry Industry in Ghana.
3. Some common breeds of Poultry.
4. Systems of poultry keeping.
5. Incubation--principles and practice.
6. Breeding, rearing, housing, and management of poultry.
7. Record keeping.
8. Common diseases of poultry, causes, symptoms, and control measures.
9. Castration--reasons and methods.
10. Artificial Insemination.
11. Numbering of farm animals.

12. Pig Husbandry--prospects and limitations in Ghana, common breeds, housing, management, common diseases and their control.
13. Cattle Husbandry--breeds, calving and calf rearing, housing, and management, common diseases and their control.
14. Sheep and Goats Husbandry--Breeds, breeding, and management; common diseases and their control.
15. Rabbit raising--Housing, Breeding Methods, feeding and management.
16. Pasture Management and Development.

Soil Science

Course Items:

1. Soil classification--emphasis on Ghana soils.
2. Plant Nutrition--micro and macro elements in the soil.
3. Nutrient deficiency sumptoms.
4. Fertilizers--types, application and effects on plants.
5. Traditional maintenance of soil fertility in Ghana--land rotation, shifting cultivation, fallow periods, etc.
6. Methods of improving soil fertility.
7. Improvement of physical condition of soil.
8. Soil erosion--effects and control.
9. Soil and water conservation.

10. Dam construction.
11. Irrigation--principles and practice, site selection, construction, etc.

Agricultural Surveying

Course Items:

1. The meaning and scope of farm management.
2. Traverses--open and close; plotting.
3. Obstacles in chain surveying and field surveying.
4. Compass surveying--picket compass, prismatic compass.
5. Levelling and levelling instruments.
6. Booking levels.
7. Contouring.

Farm Management

Course Items:

1. The meaning and scope of farm management.
2. Principles of farm planning and budgeting.
3. Selecting the farm enterprise.
4. Farm planning and lay-out.
5. Farm records and accounts.
6. Farm budgeting.
7. Farm records analysis.
8. Labour utilization in farm business.
9. Risks and uncertainties in farm business.
10. Cooperatives and Credit Unions.

Agricultural Machinery

Course Items:

1. A short history agricultural mechanization in Ghana.
2. Operating and maintaining tractors.
3. General introduction to agricultural implements--types and their uses.
4. Studying individual implements--ploughs, barrows, cultivators, etc.
5. Trouble shooting and tuning-up.
6. Field Practices--using the necessary implements for the initial farming operations.
7. Harvesting and processing equipments.
8. Organizing and maintaining a farm workshop. Managing a simple farm shop.
9. Problems of mechanization in Ghana.
10. The Log Book and how to keep it.

Agricultural Extension

Objectives: After the course, students should have the ability to:

1. Recognize farmers problems and offer advice.
2. Make on the spot decisions.
3. Conduct demonstrations.
4. Communicate effectively with rural folk.
5. Determine which method of communication to use in any given situation.

6. Use common visual aids.
7. Write short, clear and concise instructions, letters, reports, hand-outs, newspaper stories and circular letters.
8. Organize farmers.
9. Select local leaders, organize farmers' meetings and agricultural shows.
10. Plan intelligent and appropriate extension programmes for rural people.
11. Evaluate rural programmes.

In order to achieve these objectives, the following items will be covered:

1. Definition and scope of extension education.
    (a) Organization of extension work in Ghana; and other countries.
2. Extension Principles:
    (a) Philosophy
    (b) Policy
    (c) Objectives.
3. Extension as an educational process.
    (a) Teaching and learning
    (b) Communication
    (c) Diffusion
4. Extension Teaching Methods
    (a) Individual method
    (b) Group Method

(c) Mass Method

(d) The Use of Audio Visual Aids.

5. Social and cultural factors in Extension

(a) Social structure

(b) Culture of the society

(c) Barriers to change

6. Working with People

(a) Personal attitude

(b) Working with local leaders

(c) Farm Clubs and Cooperatives

(d) Public Relations

7. Planning and evaluating Extension Programmes

(a) The need for planning

(b) The planning process

(c) Steps in planning

(d) Annual plan of work and calendar

(e) Evaluation

8. Additional considerations in planning extension programmes.

(a) Programmes for rural women

(b) Programmes for young people

(c) Programmes for adults

(d) The role of farm institutes

Students are expected to do these related activities for practical experience.

1. Examine pamphlets, newspaper articles and posters use in extension projects.
2. Field extension staff to be invited to give talk on their field work.
3. Participation of students in debates and symposiums.
4. Visit to agricultural shows to see how the shows are organized.
5. Use of simple visual aids.
6. Attending cooperative meetings to see how farmers cooperatives are organized and run.

APPENDIX C

TECHNICAL OFFICERS

APPENDIX C

TECHNICAL OFFICERS

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

EXTENSION ORGANIZATION AND ADMINISTRATION	Needed	Not Needed	Degree of Competence Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. A knowledge of the history of Extension										
2. An understanding of the philosophy of Extension										
3. An understanding of how the Ghana Agricultural Extension Service is organized										
4. An understanding of how policies are formulated in the Ghana Agricultural Extension Service										
5. A knowledge of existing policies in the Ghana Agricultural Extension Service										
6. An understanding of the duties and responsibilities of the extension officer										
7. An understanding of principles and procedures in office management										
8. An understanding of the functions and responsibilities of Agricultural Research stations and their specialist staff										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

HUMAN DEVELOPMENT	Needed	Not Needed	Degree of Competence Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. An understanding of the problems of adolescents										
2. How to develop one's own leadership abilities										
3. An understanding of the basic psychological drives of people, such as the need for recognition and need for security										
4. An understanding of the factors affecting the behavior of people										
5. A knowledge of the attitudes and values held by people										
6. An understanding of why people have certain goals in life										
7. An understanding of the reasons for aggressive behavior										
8. A knowledge of the principles and techniques in effective counseling										
9. How to develop an approach to Extension work that considers the feelings and values of the people served by the program										
10. An understanding of the factors affecting personality development										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

EDUCATIONAL PROCESS	Needed	Not Needed	Degree of Competence Possessed					When Competence Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Understanding how people learn										
2. Understanding of the problems of individual differences as related to the learning process										
3. Understanding the relation of experience to learning										
4. Understanding the relation of learning to what we perceive (see, feel and hear) through our senses										
5. Understanding the relationship between the need for and usefulness of subject matter information to learning										
6. Understanding the relation of interest to learning										
7. Knowledge of the principles and procedures in teaching adults										
8. How to use teaching methods more effectively										
9. Understanding of the psychological theories of learning										
10. Understanding how to motivate people										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence.

SOCIAL SYSTEMS	Needed	Not Needed	Degree of Competence Possessed					When Competence Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Understanding of the community organization in the district										
2. Understanding of the pattern of independence of the various groups in the district										
3. Understanding of the role of the "informal" leader in the acceptance of new practices										
4. Knowledge of how to identify leadership in the district										
5. Understanding of the effect of changing social values on family life in the district										
6. Understanding of why people join groups and organizations										
7. Understanding the functions of farm organizations in rural life										
8. Understanding of the interactions of individuals in groups										
9. Understanding of the purposes of the various public agencies in the district and their relation to the Extension Service										

SOCIAL SYSTEMS (continued)	Needed	Not Needed	Degree of Competency Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
10. Understanding of the relation of social system (the family, the community, organizations and groups) to Communications										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

PROGRAM PLANNING AND DEVELOPMENT	Needed	Not Needed	Degree of Competence Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. How to analyze the agricultural situation in assigned district										
2. How to effectively organize and plan extension program										
3. How to organize village extension program planning committees										
4. An understanding of the role the extension officer should assume with program planning committees										
5. How to involve "lay" people in program development										
6. How to develop people's understanding of the district situation (Program Committee members and others)										
7. How to identify problems in the district situation and determine the priority of problems										
8. How to develop a long-time Extension program										
9. How to determine objectives of the district program										
10. How to relate the national plan of work to the district extension program plan										

PROGRAM PLANNING AND DEVELOPMENT (continued)	Needed	Not Needed	Degree of Competency Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
11. How to "build-in" evaluation procedures into program plans										
12. How to use specialists in program development										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

COMMUNICATIONS	Needed	Not Needed	Degree of Competence Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Understanding the basic principles of communication										
2. Understanding the relationship between group processes and communication										
3. How to prepare and deliver effective public speeches										
4. How to develop and use exhibits effectively										
5. How to write effective reports										
6. How to write effective news articles										
7. How to use radio effectively and efficiently										
8. How to use visual aids in teaching										
9. How to use photographs effectively in Extension communication										
10. How to conduct effective farm visits										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

EFFECTIVE THINKING	Needed	Not Needed	Degree of Competency Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. An understanding of the processes of logical reasoning										
2. An understanding of the relation between language (terms used) and the thinking process										
3. An understanding of the use of the "problem solving" method in effective thinking										
4. An understanding of the effect of bias on the thinking process										
5. An understanding of the effect of pressure groups on the thinking process										
6. A knowledge of techniques for developing effective thinking in Extension groups										
7. How to use the problem solving approach in Extension work										
8. A knowledge of the principles of creative thinking										
9. An understanding of the role of the Extension Officer in predicting probable future results from existing facts										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

TECHNICAL KNOWLEDGE	Needed	Not Needed	Degree of Competency Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Methods of cultivating different types of crops										
2. Control of insects on different crops										
3. Diagnosis and treatment of diseases in crops										
4. Knowledge of crop rotation systems										
5. Weed killers and how to use them										
6. Knowledge of improved and best varieties of the most common crops grown in the country										
7. Knowledge of storage of different harvest crops										
8. Recognizing deficiencies in nutritions--crops										
9. Collecting and preparing samples of plant tissues for laboratory										
10. Kinds and usage of budding and pruning										
11. Landscape, gardening and home beautification										
12. Knowledge of forest conservation and exploitation										
13. Animal and poultry husbandry										
14. Control of parasites on livestock										

TECHNICAL KNOWLEDGE (continued)	Needed	Not Needed	Degree of Competency Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
15. Diagnosis and treatment diseases of livestock										
16. General knowledge about animal breeding										
17. Nutrition and alimentation of animals										
18. Preparing, showing and judging animals for agricultural shows										
19. Knowledge of wildlife conservation										
20. Knowledge of fertilizer requirements for different crops and how to apply them										
21. Taking soil sample for analysis										
22. Working on a soil conservation program										
23. Making and using plans for drainage										
24. Preparing composts or other organic fertilizers										
25. Knowledge of reading soil map										
26. Agricultural Engineering including machinery and building										
27. Needs, uses, advantages and disadvantages of farm mechanization										
28. Knowledge of water conservation										
29. Knowledge of agricultural credit										
30. Efficient use of manual labour										
31. Establishing the farm budget										
32. Determining different costs of farm production										
33. Farming Program Planning										
34. Systems of farm bookkeeping										
35. Food and agricultural marketing										

TECHNICAL KNOWLEDGE (continued)	Needed	Not Needed	Degree of Competency Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
36. Analysis of factors of success or failure on specific farms										
37. Reducing operating costs in a farm										
38. Farm Management										
39. Judging various farm products										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by you and indicate when the competency was acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

RESEARCH AND EVALUATION	Needed	Not Needed	Degree of Competence Possessed					When Competency Was Acquired		
			1	2	3	4	5	Before College	In College	After College
1. A knowledge of procedures or methods for measuring results of programs										
2. How to use the experimental approach (pilot projects) in extension work										
3. How to interpret the results of research										
4. An understanding of research terminology										
5. A knowledge of the procedures for applying research findings when assisting the people in your district										
6. An understanding of the design for evaluation studies in Extension Education										
7. How to develop simple survey devices										
8. Understanding the role of research in solving problems with people										
9. A knowledge of where to obtain sound research information										
10. How to make the best use of research publications										

Below is a suggested list of Areas of Training in which it might be desirable for Extension Officers (T.O.'s) to be trained before taking up extension duties. Please check the column which indicates most accurately your reaction to each of the following Nine Areas of Training as to whether they are VERY IMPORTANT, IMPORTANT, NOT IMPORTANT to be included in the Pre-Service Training Program of Extension Officers (T.O.'s).

AREA OF TRAINING	Very Important	Important	Not Important
Extension Organization and Administration			
Human Development: developmental processes of people, group interaction principles			
The Education Process: principles of learning, teaching methods and philosophy of education			
Social Systems: family, community, school, church groups, special interest groups, farmer organizations			
Program Planning and Development			
Communication: basic communication, individual, group and mass media			
Effective Thinking: problem solving method, decision making based on critical analysis			
Technical Knowledge: Subject matter in agriculture			
Research and Evaluation: principles of research and evaluation, methods of utilizing research findings			

On the preceding pages you have indicated the importance of some areas of Extension Officer (T.O.'s) Pre-Service Training. Perhaps there are some additional areas that were not listed in which you feel a need for Extension Officer Pre-Service Training. If this is the case, please write the area(s) below.

APPENDIX D

SENIOR TECHNICAL OFFICERS

APPENDIX D

SENIOR TECHNICAL OFFICERS

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

EXTENSION ORGANIZATION AND ADMINISTRATION	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. A knowledge of the history of Extension										
2. An understanding of the philosophy of Extension										
3. An understanding of how the Ghana Agricultural Extension Service is organized										
4. An understanding of how policies are formulated in the Ghana Agricultural Extension Service										
5. A knowledge of existing policies in the Ghana Agricultural Extension Service										
6. An understanding of the duties and responsibilities of the extension officer										
7. An understanding of principles and procedures in office management										
8. An understanding of the functions and responsibilities of Agricultural Research stations and their specialist staff										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

HUMAN DEVELOPMENT	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. An understanding of the problems of adolescents										
2. How to develop one's own leadership abilities										
3. An understanding of the basic psychological drives of people, such as the need for recognition and need for security										
4. An understanding of the factors affecting the behavior of people										
5. A knowledge of the attitudes and values held by people										
6. An understanding of why people have certain goals in life										
7. An understanding of the reasons for aggressive behavior										
8. A knowledge of the principles and techniques in effective counseling										
9. How to develop an approach to Extension work that considers the feelings and values of the people served by the program										
10. An understanding of the factors affecting personality development										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

EDUCATIONAL PROCESS	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Understanding how people learn										
2. Understanding of the problems of individual differences as related to the learning process										
3. Understanding the relation of experience to learning										
4. Understanding the relation of learning to what we perceive (see, feel and hear) through our senses										
5. Understanding the relationship between the need for and usefulness of subject matter information to learning										
6. Understanding the relation of interest to learning										
7. Knowledge of the principles and procedures in teaching adults										
8. How to use teaching methods more effectively										
9. Understanding of the psychological theories of learning										
10. Understanding how to motivate people										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

SOCIAL SYSTEMS	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Understanding of the community organization in the district										
2. Understanding of the pattern of interdependence of the various groups in the district										
3. Understanding of the role of the "informal" leader in the acceptance of new practices										
4. Knowledge of how to identify leadership in the district										
5. Understanding of the effect of changing social values on family life in the district										
6. Understanding of why people join groups and organizations										
7. Understanding the functions of farm organizations in rural life										
8. Understanding of the interactions of individuals in groups										
9. Understanding of the purposes of the various public agencies in the district and their relation to the Extension Service										

SOCIAL SYSTEMS (continued)	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
10. Understanding of the relation of social systems (the family, the community, organizations and groups) to communications										

DIRECTIONS: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

PROGRAM PLANNING AND DEVELOPMENT	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. How to analyze the agricultural situation in assigned district										
2. How to effectively organize and plan extension program										
3. How to organize village extension program planning committees										
4. An understanding of the role the extension officer should assume with program planning committees										
5. How to involve "lay" people in program development										
6. How to develop people's understanding of the district situation (Program committee members and others)										
7. How to identify problems in the district situation and determine the priority of problems										
8. How to develop a long-time Extension program										
9. How to determine objectives of the district program										

PROGRAM PLANNING AND DEVELOPMENT (continued)	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
10. How to relate the national plan of work to the district extension program plan										
11. How to "build-in" evaluation procedures into program plans										
12. How to use specialists in program development										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

COMMUNICATIONS	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Understanding the basic principles of communication										
2. Understanding the relationship between group processes and communication										
3. How to prepare and deliver effective public speeches										
4. How to develop and use exhibits effectively										
5. How to write effective reports										
6. How to write effective news articles										
7. How to use radio effectively and efficiently										
8. How to use visual aids in teaching										
9. How to use photographs effectively in Extension Communication										
10. How to conduct effective farm visits										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

EFFECTIVE THINKING	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. An understanding of the processes of logical reasoning										
2. An understanding of the relation between language (terms used) and the thinking process										
3. An understanding of the use of the "problem solving" method in effective thinking										
4. An understanding of the effect of bias on the thinking process										
5. An understanding of the effect of pressure groups on the thinking process										
6. A knowledge of techniques for developing effective thinking in Extension groups										
7. How to use the problem solving approach in Extension work										
8. A knowledge of the principles of creative thinking										
9. An understanding of the role of the Extension Officer in predicting probable future results from existing facts										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

TECHNICAL KNOWLEDGE	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. Methods of cultivating different types of crops										
2. Control of insects on different crops										
3. Diagnosis and treatment of diseases in crops										
4. Knowledge of crop rotation systems										
5. Weed killers and how to use them										
6. Knowledge of improved and best varieties of the most common crops grown in the country										
7. Knowledge of storage of different harvest crops										
8. Recognizing deficiencies in nutritions--crops										
9. Collecting and preparing samples of plant tissues for laboratory										
10. Kinds and usage of budding and pruning										
11. Landscape, gardening and home beautification										
12. Knowledge of forest conservation and exploitation										
13. Animal and poultry husbandry										

TECHNICAL KNOWLEDGE (continued)	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
14. Control of parasites on livestock										
15. Diagnosis and treatment of diseases of livestock										
16. General knowledge about animal breeding										
17. Nutrition and alimentation of animals										
18. Preparing, showing and judging animals for agricultural show										
19. Knowledge of wildlife conservation										
20. Knowledge of fertilizer requirements for different crops and how to apply them										
21. Taking soil sample for analysis										
22. Working on a soil conservation program										
23. Making and using plans for drainage										
24. Preparing composts or other organic fertilizers on the farm										
25. Knowledge of reading soil map										
26. Agricultural Engineering--including machinery and building										
27. Needs, uses, advantages and disadvantages of farm mechanization										
28. Knowledge of water conservation										
29. Knowledge of agricultural credit										
30. Efficient use of manual labour										
31. Establishing the farm budget										
32. Determining different costs of farm production										
33. Farming Program Planning										
34. Systems of farm bookkeeping										

TECHNICAL KNOWLEDGE (continued)	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
35. Food and agricultural marketing										
36. Analysis of factors of success or failure on specific farms										
37. Reducing operating costs in a farm										
38. Farm management										
39. Judging various farm products										

DIRECTIONS: Indicate your perception of competence need or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture; degree of competence possessed by Technical Officers engaged in Extension duties working under you; also indicate when in your opinion the competencies should be acquired--Before College, In College or After College.

NOTE: "1" represents a low degree of competence possessed and "5" represents a high degree of competence possessed.

RESEARCH AND EVALUATION	Needed	Not Needed	Degree of Competence Possessed					When Should Competencies Be Acquired		
			1	2	3	4	5	Before College	In College	After College
1. A knowledge of procedures or methods for measuring results of programs										
2. How to use the experimental approach (pilot project in extension work)										
3. How to interpret the results of research										
4. An understanding of research terminology										
5. A knowledge of the procedures for applying research findings when assisting the people in your district										
6. An understanding of the design for evaluation studies in Extension Education										
7. How to develop single survey devices										
8. Understanding the role of research in solving problems with people										
9. A knowledge of where to obtain sound research information										
10. How to make the best use of research publications										

Below is a suggested list of Areas of Training in which it might be desirable for Extension Officers (T.O.'s) to be trained before taking up extension duties. Please check the column which indicates most accurately your reaction to each of the following Nine Areas of Training as to whether they are VERY IMPORTANT, IMPORTANT, NOT IMPORTANT to be included in the Pre-Service Training Program of Extension Officers (T.O.'s).

AREA OF TRAINING	Very Important	Important	Not Important
Extension Organization and Administration			
Human Development: developmental processes of people, group interaction principles			
The Education Process: principles of learning, teaching methods and philosophy of education			
Social Systems: family, community, school, church groups, special interest groups, farmer organizations			
Program Planning and Development			
Communication: basic communication, individual, group and mass media			
Effective Thinking: problem solving method, decision making based on critical analysis			
Technical Knowledge: Subject matter in agriculture			
Research and Evaluation: principles of research and evaluation, methods of utilizing research findings			

On the preceding pages you have indicated the importance of some areas of Extension Officer (T.O.'s) Pre-Service Training. Perhaps there are some additional areas that were not listed in which you feel a need for Extension Officer Pre-Service Training. If this is the case, please write the area(s) below.

APPENDIX E

FACULTY OF AGRICULTURAL COLLEGES

APPENDIX E

FACULTY OF AGRICULTURAL COLLEGES

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

Extension Organization and Administration	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. A knowledge of the history of Extension					
2. An understanding of the philosophy of Extension					
3. An understanding of how the Ghana Agricultural Extension Service is organized					
4. An understanding of how policies are formulated in the Ghana Agricultural Extension Service					
5. A knowledge of existing policies in the Ghana Agricultural Extension Service					
6. An understanding of the duties and responsibilities of the extension officer					
7. An understanding of principles and procedures in office management					
8. An understanding of the functions and responsibilities of Agricultural Research stations and their specialist staff					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

HUMAN DEVELOPMENT	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. An understanding of the problems of adolescents					
2. How to develop one's own leadership abilities					
3. An understanding of the basic psychological drives of people, such as the need for recognition and need for security					
4. An understanding of the factors affecting the behavior of people					
5. A knowledge of the attitudes and values held by people					
6. An understanding of why people have certain goals in life					
7. An understanding of the reasons for aggressive behavior					
8. A knowledge of the principles and techniques in effective counseling					
9. How to develop an approach to Extension work that considers the feelings and values of the people served by the program					
10. An understanding of the factors affecting personality development					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

EDUCATIONAL PROCESS	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. Understanding how people learn					
2. Understanding of the problems of individual differences as related to the learning process					
3. Understanding the relation of experience to learning					
4. Understanding the relation of learning to what we perceive (see, feel and hear) through our senses					
5. Understanding the relationship between the need for and usefulness of subject matter information to learning					
6. Understanding the relation of interest to learning					
7. Knowledge of the principles and procedures in teaching adults					
8. How to use teaching methods more effectively					
9. Understanding of the psychological theories of learning					
10. Understanding how to motivate people					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

SOCIAL SYSTEMS	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. Understanding of the community organization in the district					
2. Understanding of the pattern of interdependence of the various groups in the district					
3. Understanding of the role of the "informal" leader in the acceptance of new practices					
4. Knowledge of how to identify leadership in the district					
5. Understanding of the effect of changing social values on family life in the district					
6. Understanding of why people join groups and organizations					
7. Understanding the functions of farm organizations in rural life					
8. Understanding of the interactions of individuals in groups					
9. Understanding of the purposes of the various public agencies in the district and their relation to the Extension Service					
10. Understanding of the relation of social systems (the family, the community, organizations and groups) to communications					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

PROGRAM PLANNING AND DEVELOPMENT	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. How to analyze the agricultural situation in assigned district					
2. How to effectively organize and plan extension program					
3. How to organize village extension program planning committees					
4. An understanding of the role the extension officer should assume with program planning committees					
5. How to involve "lay" people in program development					
6. How to develop people's understanding of the district situation (Program Committee members and others					
7. How to identify problems in the district situation and determine the priority of problems					
8. How to develop a long-time Extension program					
9. How to determine objectives of the district program					
10. How to relate the national plan of work to the district extension program plan					
11. How to "build-in" evaluation procedures into program plans					
12. How to use specialists in program development					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

COMMUNICATION	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. Understanding the basic principles of communication					
2. Understanding the relationship between group processes and communication					
3. How to prepare and deliver effective public speeches					
4. How to develop and use exhibits effectively					
5. How to write effective reports					
6. How to write effective news articles					
7. How to use radio effectively and efficiently					
8. How to use visual aids in teaching					
9. How to use photographs effectively in Extension Communication					
10. How to conduct effective farm visits					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

EFFECTIVE THINKING	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. An understanding of the processes of logical reasoning					
2. An understanding of the relation between language (terms used) and the thinking process					
3. An understanding of the use of the "problem solving" method in effective thinking					
4. An understanding of the effect of bias on the thinking process					
5. An understanding of the effect of pressure groups on the thinking process					
6. A knowledge of techniques for developing effective thinking in Extension groups					
7. How to use the problem solving approach in Extension work					
8. A knowledge of the principles of creative thinking					
9. An understanding of the role of the Extension officer in predicting probable future results from existing facts					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate When the competencies should be acquired--Before College, In College, After College.

TECHNICAL KNOWLEDGE	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. Methods of cultivating different types of crops					
2. Control of insects on different crops					
3. Diagnosis and treatment of diseases in crops					
4. Knowledge of crop rotation systems					
5. Weed killers and how to use them					
6. Knowledge of improved and best varieties of the most common crops grown in the country					
7. Knowledge of storage of different harvest crops					
8. Recognizing deficiencies in nutritions--crops					
9. Collecting and preparing samples of plant tissues for laboratory					
10. Kinds and usage of budding and pruning					
11. Landscape, gardening and home beautification					
12. Knowledge of forest conservation and exploitation					
13. Animal and poultry husbandry					
14. Control of parasites on livestock					
15. Diagnosis and treatment of diseases of livestock					
16. General knowledge about animal breeding					
17. Nutrition and alimentation of animals					
18. Preparing, showing and judging animals for agri-cultural shows					
19. Knowledge of wildlife conservation					
20. Knowledge of fertilizer requirements for different crops and how to apply them					
21. Taking soil sample for analysis					
22. Working on a soil conservation program					
23. Making and using plans for drainage					

TECHNICAL KNOWLEDGE (continued)	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
24. Preparing composts or other organic fertilizers on the farm					
25. Knowledge of reading soil map					
26. Agricultural Engineering--including machinery and building					
27. Needs, uses, advantages and disadvantages of farm mechanization					
28. Knowledge of water conservation					
29. Knowledge of agricultural credit					
30. Efficient use of manual labour					
31. Establishing the farm budget					
32. Determining different costs of farm production					
33. Farming Program Planning					
34. Systems of farm bookkeeping					
35. Food and agricultural marketing					
36. Analysis of factors of success or failure on specific farms					
37. Reducing operating costs in a farm					
38. Farm Management					
39. Judging various farm products					

Directions: Indicate your perception of competence needed or not needed by beginning Technical Officers employed as Extension Officers in the Ministry of Agriculture and indicate when the competencies should be acquired--Before College, In College, After College.

RESEARCH	Needed	Not Needed	When Should Competencies Be Acquired		
			Before College	In College	After College
1. A knowledge of procedures or methods for measuring results of program					
2. How to use the experimental approach (pilot projects) in extension work					
3. How to interpret the results of research					
4. An understanding of research terminology					
5. A knowledge of the procedures for applying research findings when assisting the people in your district					
6. An understanding of the design for evaluation studies in Extension Education					
7. How to develop simple survey devices					
8. Understanding the role of research in solving problems with people					
9. A knowledge of where to obtain sound research information					
10. How to make the best use of research publications					

Below is a suggested list of Areas of Training in which it might be desirable for Extension Officers (T.O.'s) to be trained before taking up extension duties. Please check the column which indicates most accurately your reaction to each of the following Nine Areas of Training as to whether they are VERY IMPORTANT, IMPORTANT, NOT IMPORTANT to be included in the Pre-Service Training Program of Extension Officers (T.O.'s).

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Program Planning and Development			
Communication: basic communication, individual, group and mass media			
Effective Thinking: problem solving method, decision making b based on critical analysis			
Technical Knowledge: Subject matter in agriculture			
Research: principles of research and evaluation, methods of utilizing research findings			

On the preceding pages you have indicated the importance of some areas of Extension Officer (T.O.'s) Pre-Service Training. Perhaps there are some additional areas that were not listed in which you feel a need for Extension Officer Pre-Service Training. If this is the case, please write the area(s) below.

APPENDIX F

APPENDIX F

My Ref. No. D/A. 15/5/TJ

Ministry of Agriculture,
P.O. Box M.37,
Accra.

10th February, 1976.

"PRE-SERVICE PROFESSIONAL DEVELOPMENT NEEDS FOR AGRICULTURAL EXTENSION OFFICERS IN GHANA"

Mr. Joe K. Geker, a lecturer in Agricultural Extension at the University of Ghana, Legon, who is now on study leave reading for Ph.D. degree at Michigan State University, East Lansing, Michigan U.S.A., is in Ghana to collect data for his dissertation.

2. The dissertation is "Pre-Service Professional Development Needs for Agricultural Extension Officers in Ghana," Mr. Joe K. Geker will visit the Regions and Agricultural Colleges to interview

(a) a number of Technical Officers working in the field

(b) S.T.O.'s or A.O.'s who supervise T.O.'s in the field

(c) members of staff of Agricultural Colleges.

3. You are kindly requested to give Mr. Joe Geker all the assistance he might need with regard to his survey.

for: DIRECTOR OF AGRICULTURE
(K. A. COLEMAN)

DEP. DIRECTOR OF AGRIC. EASTERN REGION

REG. AGRIC. OFFICER, ASHANTI REGION.

REG. AGRIC. OFFICER, BRONG AHAFO REGION.

REG. AGRIC. OFFICER, NORTHERN REGION.

REG. AGRIC. OFFICER, UPPER REGION.

REG. AGRIC. OFFICER, CENTRAL REGION.

REG. AGRIC. OFFICER, WESTERN REGION.

REG. AGRIC. OFFICER, VOLTA REGION.

REG. AGRIC. OFFICER, GREATER ACCRA REGION.

cc: The Officer-in-charge,
Kwadaso Agric. College,
Kwadaso, Kumasi

The Officer-in-charge,
Nyankpala Agric. College,
Nyankpala

The Officer-in-charge,
Ohawu Agric. College,
Ohawu

Mr. Joe K. Geker,
University of Ghana,
Dept. of Agric. Economy,
Faculty of Agriculture,
Legon

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