

**CONSULTANT REPORT ON CAA AGRICULTURAL  
OFFICERS TRAINING PROGRAM IN  
THE REPUBLIC OF MALI**

**August, 1981**

**Prepared by  
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**Supported by Contract Number  
AFR-0207-5-00-1072-00**

1

TABLE OF CONTENTS

	Page
FORWARD . . . . .	11
A BRIEF DESCRIPTION OF THE CENTRE d'APPRENTISSAGE AGRICOLE. .	1
INTRODUCTION. . . . .	3
Role of CAA's in Malian Agricultural Extension. . . . .	3
Role of USAID in Malian Agricultural Extension. . . . .	5
The Agricultural Officers Training Project. . . . .	6
ROLE OF USAID AGRICULTURAL EDUCATION SHORT-TERM CONSULTANT. .	9
Guidance to the World Bank Funded Technical Assistants	10
Review and Evaluation of Agricultural Education	
Curriculum Currently Being Implemented at CAA's . .	11
Programmes d'Enseignements et d'Activites dan les	
Centres d'Apprentissage Agricole. . . . .	12
Visit CAA/Samanko to obtain an overview of the	
Physical Facilities Funded by World Bank. . . . .	15
Review and Evaluate the Reference Materials	
Currently Available to CAA Instructors. . . . .	17
Observe and Evaluate Instructors Classroom Teaching	
Strategies at CAA/Samanko . . . . .	19
Fiche Pedagogique Modele I . . . . .	26
Fiche Pedagogique Modele II . . . . .	27
En Agriculture Generale - 1 ere Annee . . . . .	28
En Agriculture Speciale en 2 eme Annee. . . . .	28
En Economie 1'ere et 2e Annee . . . . .	28
En Vulgarisation 2 eme Annee . . . . .	29
En Protection Des Vegetaux . . . . .	29
En Botanique 2 ere Annee . . . . .	29
En Zootechnie generale 1 ere Annee et Speciale. .	29
En Enseignement Generale . . . . .	30
En Topographie 1 ere et 2 eme Annee . . . . .	30
En Machinisme Agricole 1 ere et 2 eme Annee . . .	30
En Travaux Ruraux 1 ere Annee et 2 eme Annee. . .	30
En Travaux Pratiques 1 ere et 2 eme Annee . . . .	31
Curriculum Materials and Visual Aids Workshop . . . .	32
Recommendations . . . . .	36
ISSUES FOR CONSIDERATION. . . . .	41
REFERENCES. . . . .	46

## FORWARD

This document describes the duties performed by the consultant, Dr. James E. Diamond, Assistant Professor and Coordinator of General Agriculture, The Pennsylvania State University, as per contract number AFR-0207-S-00-1072-00 dated July 2, 1981, for project number 688-207-3-10009 entitled "Agricultural Officers Training." This document consists of a cover page and 47 pages, including a table of contents. As per Article 2, section E, page 3 of the above said contract, "A final report listing the findings, conclusions, and recommendations of the studies described in B above shall be presented to USAID project manager prior to technicians departure from Bamako...." This document shall be considered the above said final report prepared and written by the above mentioned, Dr. James E. Diamond.

The sequence of this final report shall follow the outline used in Article 1, section B, page 3 "Specific Duties to be Performed" in said contract. Each individual section is intended to stand alone. Therefore, persons using this final report may use individual section of report as described herein.

Appreciation is extended to the Boubacar A. Guindo, Project Director, Centre d'Apprentissage Agricole (CAA), CAA/Bamako and Maurice Fleming, Project Manager, USAID/Bamako for their input and assistance in providing the necessary information required to report the findings and recommendations herein. Recognition is also due to Djibril Sangare, Director, Section Methodes et Programmes, Direction National Formation Animation Rural (DNFAR) for his contribution of providing information on present CAA pedagogical training, CAA proprogram of study, curriculum materials, library facilities

and CAA teaching methods. A special thank you to the director and staff of CAA/Samanko for their cooperation in allowing this author to observe their CAA facilities and to attend, observe, and evaluate their classes.

A BRIEF DESCRIPTION OF THE  
CENTRE d'APPRENTISSAGE AGRICOLE (CAA's)

The Government of the Republic of Mali (GRM) currently operates three CAA's. These schools are designed to provide Agricultural and Extension Education for agricultural officers who are known as "moniteurs d'agriculture". Each CAA is associated with a former state farm and is responsible to the Division of Technical Agricultural Education and Professional Training (DAEPT) in DNFAR within the Ministry of Rural Development. The CAA's are located in three different ecological zones of Mali; this permits each center to focus on the cultivation of different crops and varying horticultural practices, as well as the various types of animal husbandry. While the centers may not provide practical experience with all types of agriculture practiced in Mali, they do provide a more complete approach than a single center concept. The CAA centers are located at Sane, M'Pessoba, and Samanko.

Upon completion of two years of intensive study at the CAA's, students are required to complete a one-year internship at one of three specialized agricultural training centers. These internship training centers are located at Baguinda, Dioro, and <sup>Kita</sup>Tabakoro.

After the student graduates from the CAA receiving a "Certificat d'Aptitude Professionnelle Agricole", he/she is employed by one of the Operations. The Operations which are regionally based, are primarily concerned with only one or two crops.

The moniteurs d'Agricole, with the help of the encadreurs (agricultural workers with less training) supervise and serve as the contact between the Operation and the farmer. They arrange for the agricultural

inputs (seeds, fertilizer, tools, etc.) and the credit necessary for their purchases. Through demonstrations and other extension techniques they provide the farmers with the particular production package that the Operation is sponsoring. At harvest time, the moniteurs d'Agricole and encadreurs arrange for the marketing and transportation of the crops.

Given the relatively large distances between the villages where the moniteurs d'Agricole work and the central offices for the Operations, the poor roads and the limited means of transportation, the moniteurs d'Agricole typically go for long periods without major supervision. Thus the moniteur d'Agricole is in a position where he/she is called upon to perform his/her task independently. Therefore, it is essential that the CAA's provide their students with both the knowledge and the extension skills necessary for them to work independently.

## INTRODUCTION

Increased agricultural production is one of the development strategy goals of the Government of the Republic of Mali (GRM). The agricultural education contribution of village-level agricultural extension agents (moniteurs d'Agricole) for the introduction of new cultivation methods, crop varieties, livestock management techniques and Malian research developments is considered by GRM as essential for efficient and rapid agricultural development. Moniteurs d'Agricole are the junior-level technicians directly responsible for the implementation of agricultural development projects. To attain this goal, the GRM plans to increase the number of moniteurs d'Agricole trained each year at the CAA's, and to improve the quality of their pedagogical and technical training. It is anticipated that these objectives will be realized through refurbishing the CAA physical facilities, improvement of the infrastructure of the CAA's, development of new innovative teaching materials, development and implementing new teaching strategies, and encouragement of further inservice training of moniteurs d'Agricole in the field. This project is being undertaken by the GRM with assistance from USAID and the World Bank in collaboration with the Direction National Formation Animation Rural (DNFAR), a division of the Ministry of Rural Development.

### Role of CAA's in Malian Agricultural Extension

Since 1972, the Malian strategy for agricultural development has sought to establish managerially and financially autonomous Operations in order to increase and improve agricultural production within specified agro-geographical areas. In contrast to the former organization of the

4

agricultural services, which paralleled the colonial administrative structure of government, the Operations have improved the delivery of agricultural inputs to farmers and do represent a more efficient use of the resources to promote agricultural development (Binger, 1976).

If the Operations are to play a pivotal role in rural development in Mali, they must be adequately staffed with capable and qualified personnel. Current estimates indicate that the demands for senior- and middle-level agricultural cadres will be more than satisfied for several years (Binger, 1976). The supply of junior-level personnel on the otherhand according to "Ag Officers Training Project, Part 1 E8, p. 7, is more problematic. Guindo (1981) stated "the CAA's supply only about 85 moniteurs d'Agricole per year in contrast to a demand of over 175.

For intensive primary level professional agricultural education training, it appears the CAA program is Mali's most effective agricultural education system. From all accounts, the CAA's are the only educational institutions which are capable of supplying well-trained junior-level technicians who are directly responsible for implementing agricultural education concepts into the rural populace in Mali at the present time.

As per the Agricultural Officers Training Project, the five year plan of the GRM estimates that the successful implementation of agricultural projects from 1974 to 1978 required 340 agricultural moniteurs d'Agricole per year. More recent estimates based on current hiring practices, immediate post-plan demand suggests a total demand for 1,623 moniteurs d'Agricole or 203 per year from 1976/77 to 1984/85 (Binger, 1976). According to Sangoré (1981) the current numbers of students completing

their training at the CAA's ranges from 75-85 graduates each year. Apparently this number of moniteurs d'Agricole who enter the field each year falls considerably short of the demand. The moniteurs d'Agricole occupy an important position in rural development in Mali and their insufficient numbers raise serious problems for Mali's efforts to enhance agricultural production.

#### Role of USAID in Malian Agricultural Extension

To expand the enrollment capacity by renovating the physical facilities, improve the curriculum, develop innovative curriculum materials, introduce alternative teaching strategies, and develop the pedagogical skills of moniteurs d'Agricole, the GRM had requested USAID assistance. A GRM delegation visited AID/Washington in June 1975 to present the basic request and provided the necessary documentation for submission of the initial PID. This PID, "Expansion of Agricultural Extension Training," presented in the FY 1976 ABS, was amended to include the Rural Polytechnical Institute (IPR) on September 27, 1975 and was retitled the "Improvement of Agricultural Officers Training."

After further consultations with the GRM it was decided to concentrate USAID efforts on the renovation and improvement of training at the Same and M'Pessoba centers. However, due to "sky-rocketing" construction costs caused by inflation and other factors, the USAID construction funds were concentrated only at the CAA/Same. The USAID project at CAA/Same is nearly completed and will expand the enrollment capacity to 160 students with 80 students per class. It is anticipated that the physical facilities at CAA/Same will be completed for use commencing, May, 1982.

The physical facilities at M'Passaba as of August 1981 were not renovated nor improved by USAID funds or World Bank funds. However, it is anticipated that technical assistance for curriculum development, introduction of alternative teaching strategies, and innovative development of curriculum materials will be provided by USAID funds at M'Passaba as well as Sane and Samanko.

The physical facilities at Samanko financed by the World Bank (IBRD) are nearly completed and are partially in use as of August, 1981. The World Bank is to be commended for providing an impressive physical CAA facility at Samanko. The IBRD financed CAA was designed to expand the enrollment to 120 students or 60 students per class. USAID/Bamako has worked closely with IBRD to coordinate donor financed inputs for the CAA system, and the GEM is fully aware that USAID and IBRD are collaborating extensively in the development and execution of project financing.

#### The Agricultural Officers Training Project

The project purpose is to increase the capacity of the CAA's to provide well-trained junior-level moniteurs d'Agricole. It is anticipated that the number of moniteurs d'Agricole graduating each year will nearly double in number. Furthermore, it is anticipated that the quality of CAA training will be enhanced by the contributions of USAID and World Bank technical assistance teams.

This project consists of four basic components:

1. Construction
2. Participant Training for CAA Teachers
3. Technical Assistance
4. Equipment and Vehicular Support and Maintenance

To increase the number of CAA graduates, the physical facilities at two CAA's, one at Same and one at Samanko were built and/or renovated as necessary between 1977 and 1981. USAID funding implemented the construction of the CAA/Same and IBRD funding implemented the construction of CAA/Samanko. The USAID sponsored CAA/Same will house 160 students, including 40 women students, and consists of fully equipped classrooms, dormitories, dining facilities, staff housing, administrative offices, and specialized facilities. The IBRD sponsored CAA/Samanko has the capacity to house 120 students currently including 20 women and consists of classrooms, dormitories, dining facilities, staff housing, administration offices and specialized facilities.

Over a three-year period, short-term third country training will be provided to enhance both the teaching and administrative capabilities of CAA instructors and middle-class headquarters staff. Select groups of CAA instructors and staff will participate in teacher inservice courses and professional improvement programs in agricultural education and administration. These inservice courses will be conducted in the Republic of Mali during the CAA vacation period during the months of February, March, and April.

Administrative/management seminars are to be conducted in the Republic of Mali by a qualified management consulting firm. These seminars may be designed for a duration of six weeks with three weeks for preparation and presentation, and three weeks for follow-up and evaluation. These seminars will be focused at administrative staff members of the CAA's and select personnel of IPR, the rural development Operations, and the Ministry of agriculture. It is further anticipated that two members of

the DAEPT senior staff will study agricultural education administration and programming in a U.S. or third-country institution of higher learning.

USAID will provide personnel and services to assist in managing the project, undertake studies and provide in-service management and teacher improvement training. To implement these services, one Agricultural Education Specialist will advise the DAEPT on development and use of improved teaching materials, coordinate the in-service training and organize the third year of specialized training for junior trainees who do not attend a specialized third year internship training center. It is anticipated that one USAID Agricultural Education and Extension Instructor will be based at each of the three CAA's to serve as senior faculty with both teaching and supervisory responsibilities. Short-term consulting expertise in curriculum development, management training, women's training, village-level agricultural technology and project evaluation. In addition, one chief Agricultural Education/Administration expert will act as team leader, management consultant, and advisor to the director of the DAEPT.

All CAA's will be provided with appropriate classroom and laboratory furnishings, office and instructional supplies. USAID will provide vehicles, spare parts, and equipment to insure efficient delivery of supplies, transportation of students for field trips and administrative travel.

It is anticipated that a mechanic/instructor will be employed to train Malian mechanics at each CAA to repair and perform preventive maintenance functions on CAA vehicles. The mechanic will also design and implement a central parts requisition and distribution system for the CAA's.

## ROLE OF USAID AGRICULTURAL EDUCATION SHORT-TERM CONSULTANT

Enhancement of the professional training of moniteurs d'Agricole, as per the development strategy goal of the Republic of Mali, is contingent upon the implementation of the proposed USAID technical assistance program at the three CAA's. The role of the aforementioned short-term consultant, Dr. James E. Diamond, was to provide guidance and direction to the Government of the Republic of Mali (GRM), Ministry of Rural Development, Agricultural Education Division about the American methods of teaching agriculture education curriculum development and teacher training, in preparation for receiving the five member USAID funded technical assistance team to arrive in the fall of 1981.

The specific duties to be performed by said consultant as per contract number AFR -0207-S-00-1072-00 include the following:

1. The consultant will provide guidance to three technical assistants, funded by World Bank, towards the U.S. educational concepts.
2. Development of curriculum in Agricultural Education at approximately the high school level.
3. Structure of a modular framework of curriculum design in agriculture.
4. Structure of course outline, unit of instruction and lesson plan for a given subject area.
5. Structure of class schedules to allow for practical application of classroom theory.
6. General format of classroom presentation of subject matter (i.e. lecture, problem solving, demonstration, and to more directly involve the teachers in the learning process, or in other words:
  - a. Tell them how to do it
  - b. Show them how to do it
  - c. Have them do it

7. Methods and basis for periodic testing of students as a method of the teachers own evaluation of subject presentation and student progress.
8. Provide input and recommendations for facilities and hardware for instructional materials center.

The above mentioned duties were contracted to be performed between July 13, 1981 to August 22, 1981 by said consultant. Hereinafter, this document will describe the services performed.

Guidance to the World Bank Funded Technical Assistants:

Upon the arrival of said consultant at USAID/Bamako Mission on July 16, 1981, a meeting was conducted at the L'Amitie Hotel at 2030 with Maurice Fleming, USAID Project Manager, David Goodday, World Bank Project Manager, and James E. Diamond, USAID Consultant in attendance. It was learned at this meeting that the French technical assistants funded by the World Bank were either out of the country or about to leave the country and would not be available to receive the guidance and technical input of the said consultant during the duration of the aforementioned contract. Thus the consultant was not able to provide the guidance of U.S. agricultural educational concepts or strategies as provided for in said contract to the World Bank technical assistants. However, one World Bank technical assistant M. Marc Revol was available for a short time (one hour) on July 22, 1981 to briefly discuss with the consultant the CAA curriculum. M. Revol seemed to be enthusiastic, interested in the project, and appeared to be receptive towards the development of innovative instructional materials and new ideas for teaching strategies.

Due to the absence of the three World Bank technical assistants, and in collaboration with M. Boubacar A. Guindo, Project Director, Centre d'Apprentissage Agricole, DNFAR; Mr. Maurice Fleming, Project Director,

USAID/Bamako; M. Djibril Sangare, Director, Section Methodes et Programmes, DNFAR; M. Diop, Directeur, DNFAR; and Dr. James E. Diamond, USAID Consultant, it was agreed to:

1. Review and evaluate agricultural education curriculum currently being implemented at the CAA's.
2. Review and evaluate the reference materials currently available to CAA instructors.
3. Visit CAA/Samanko to obtain an overview of the physical facilities funded by the World Bank.
4. Observe and evaluate instructors classroom teaching strategies at CAA/Samanko.
5. Observe and evaluate the instructional materials used in the classrooms at CAA/Samanko.
6. Conduct a four day workshop entitled "Developing Malian Instructional Materials and Teaching Strategies."
  - A. Provide technical input relative to U.S. methods of instructional materials development.
  - B. Provide technical input relative to U.S. teaching strategies.
7. Provide input and recommendations for facilities and hardware for instruction materials center.
8. Provide a written final report listing the findings, conclusions, and recommendations to be presented to USAID/Bamako Project Director.

This document will hereinafter reflect those findings and recommendations.

The sequence of this final report shall now follow the outline as described above.

Review and Evaluation of Agricultural Education Curriculum Currently Being Implemented at CAA's:

The CAA curriculum being used apparently was designed by an ILO team and has had some minor adjustments to enable the directors and instructors to better utilize the available facilities and instructional materials in

their programs. The curriculum is essentially divided into three segments: Practicum (Travaux Pratique); Basic Agriculture Courses; and General Studies. The following curriculum outline provided by DNFAR illustrates the number of hours each course of study is taught per week at the CAA's during the 1981-1982 school year:

<u>Course</u>	<u>1 e Annee</u>	<u>2 e Annee</u>
Agriculture generale au speciale	5h/ semaine	5h/ semaine
Botanique	5h/ semaine	5h/ semaine
Elevage	4h/ semaine	4h/ semaine
Economie et Vulgarisation	2h/ semaine	2h/ semaine
Sport	2h/ semaine	2h/ semaine
Enseignement generale	4h/ semaine	3h/ semaine
Travaux Pratiques et Travaux Rurale	18h/ semaine	18h/ semaine
Etude et travaille personnel	<u>5h/ semaine</u>	<u>5h/ semaine</u>
Soit au total	45h/ semaine	45h/ semaine

The teaching program and activities for the 1981-1982 CAA program are illustrated in the following outline:

Programmes d'enseignements et d'activities dan les  
Centres d'Apprentissage Agricole

I. Programmes Des C.A.A.

Les disciplines enseignee sont les suivantes:

Agriculture generale	en 1 ere annee
Agriculture speciale	en 2 eme annee
Economie	en 1 ere annee et 2 eme annee
Vulgarisation	en 2 eme annee
Botanique	en 1 ere annee
Protection des vegetaux	en 2 eme annee
Zootchnie Generale	en 1 ere annee

Enseignement generale	en 1 ere annee et 2 eme annee
Topographie	en 1 ere annee et 2 eme annee
Machinisme	en 1 ere annee et 2 eme annee
Travaux Rurux (Menuiserie, forage, maconnerie)	en 1 ere annee et 2 eme annee
Travaux Pratique (Agricole et elevage)	en 1 ere annee et 2 eme annee

According to DNFAR officials M. Guindo and M. Sangare, the above Programme d'enseignement is identical at the three CAA's and is currently being implemented by CAA instructors during the 1981-1982 school year.

DNFAR officials, CAA directors and instructors are to be applauded for requiring both first and second year students to participate in a practicum program. The "hands-on experience" concept is an important phase in attaining competency-based education goals, particularly for the students whose background lack farm experience. The CAA directors are to be complimented for planning the practicum program so the groups are not too large (15 per group) and that students have the opportunity to learn agronomy, horticulture, agriculture mechanics and animal husbandry. Rotating the groups on a daily basis from animal husbandry to agriculture work stations is commendable.

The instructors of the CAA practicum program can instill the pride of workmanship within the students and attempt to remove the stigma that farming is the lowest form of work. Students (particularly those from the urban area) tend to feel that the practicum program is a "work detail" and tend not to understand the "real" educational value of the hands-on experience. Perhaps the bumper sticker slogan found in many rural communities of USA would be an appropriate motto for the CAA practicum, "I'm Proud to be a Farmer."

To recommend changes to the aforementioned formal CAA curriculum would be difficult because of the following reasons:

1. The CAA's began their school year the first week of May, 1981 and will be in session until the end of January, 1982. The curriculum for this school year has been established and approved by the directors and instructors, and are now into their fourth month of study. Hence, it would be unwise and unprofessional for an agricultural education consultant to recommend the curriculum be changed in the middle of a school year. Furthermore, it would add a great burden to the directors and instructors work load to "change horses in the middle of the stream."
2. Any curriculum adjustments to be considered should be recommended for the 1982-1983 school year. The curriculum adjustments for the ensuing year would be more acceptable by directors and instructors, create less confusion, provide a smoother transition, and would allow the instructors ample time to adjust their lesson plans accordingly.
3. Prior to making recommendations towards adjusting the CAA curriculums, it is important that pertinent data be collected to reflect the needs of students via moniteurs d'Agricole and farmers. One must determine what kinds of problems moniteurs d'Agricole face in the field; does the current CAA curriculum sufficiently prepare graduates to be an effective moniteur d'Agricole; how do farmers perceive the moniteurs d'agricole; what are the agricultural trends in Mali, etc.. Thus, before a consultant or a technical assistance team can draw any con-

clusions and recommend CAA curriculum adjustments, these questions are examples of the kinds of data one must first acquire.

4. The consultant regarded the current curriculum as ample, at least for the moment. One can always make recommendations to change any documented curriculum based on opinion. However, until some valid and reliable data can be collected to reflect the real needs of moniteurs d'Agricole, any recommendation to adjust the current curriculum will be based only on one's opinion or a consensus of opinions. Therefore, the "opinion" of the consultant is that the current curriculum is acceptable, is acknowledged by DNFAR, and is being implemented, thus, make no curriculum changes until the USAID technical assistance team arrives to collect appropriate data and collectively make valid recommendations for change.

Visit CAA/Samanko to obtain an Overview of The Physical Facilities Funded by World Bank:

The physical facilities at CAA/Samanko were recently constructed under the auspices of World Bank funding. The World Bank is to be commended for their foresight in providing the financial assistance and advocated support of the agriculture education goals of the GRM.

The physical facilities include new housing for the CAA instructors, dormitories for students, classrooms, dining room, kitchen, cattle barn, dairy barn, hog barn, poultry houses, water tower, and agriculture mechanics building.

Many of the buildings were currently in use. The dormitories and faculty housing were filled to capacity. The cattle barn contained 53 head of N'Dama cows, calves and young stock. The swine barn housed

nine sows, two boars, and two litters. The poultry houses were not filled to capacity, however, approximately 200 leghorn hens were housed.

The agriculture mechanics building was being used as a farm shop by Malian mechanics. The shop contained a number of hand cultivators, plows, power equipment, walder, garden tractors, and other shop equipment too numerous to mention. Much of the equipment had recently arrived and was still crated.

To compliment the formal education offered at the CAA/Samanko, approximately 100 hectares of cropland are available for students to acquire "hands-on" learning experiences. Crops such as millet, sorghum, corn, peanuts and cotton are grown at the center. Proceeds from the harvested crops, according to DNFAR officials, are turned over to the GRM. Students provide a large portion to the labor involved in the tillage, planting, cultivation and harvesting of the cropland. Much of the cropland is nurtured by students during the period of time scheduled for "travaux pratique."

According to the CAA/Samanko director, small plots (1/2 hectare) of land are allocated to each student to allow them to grow vegetable and/or grain crops. The proceeds from these crops apparently are retained by the individual students to be used at their own discretion.

The classrooms had ample space, were well lighted, had ample air circulation and windows were screened and there were 15 desks with the capacity to seat two students each. Some classrooms had a hardtop laboratory table approximately 1 1/2 meters from the blackboard. Ceiling fans were installed and electrical wires led to the new classroom buildings. No running water or electricity were available in the new classrooms. The motor and the generator was not yet installed, hence no electricity was available. However, the director informed me that he was optimistic

that the motor and generator would be installed before the 1982-83 school year would commence.

Review and Evaluate the Reference Materials Currently Available to CAA Instructors

The reference materials currently available to the CAA instructors are limited in scope, limited in number, somewhat outdated, and in general provide no direction on how to apply theory to practice. The booklets were apparently developed by an ILO team in the early 1970's and are the primary reference materials available to the instructors for preparing their lesson plans and lectures. The booklets are limited in number, hence, only the instructors have access to them. An instructor at CAA/Samanko was asked about the usefulness of the available reference materials, his reply was "...these materials are helpful, but we need additional books and up-to-date subject matter to effectively teach our classes."

There was a booklet developed by the ILO team for each academic subject included in the aforementioned CAA curriculum. The contents of these booklets are comprehensive and tend to be too sophisticated for the kind of work the CAA's are preparing their graduates to encounter. The question can be asked, "is this subject matter necessary to know or is it nice to know?" These materials were all academic in nature with abstract concepts containing little or no emphasis on applying abstract theory to practice.

The director and instructors at CAA/Samanko were unanimous in their concern for the lack of reference materials for preparing lesson plans. Officials at DNFAR likewise expressed a need for new and up-to-date textbooks and instructional materials.

It was pointed out by DNFAR officials that the ILO booklets have enabled the CAA directors and instructors to more uniformly coordinate the curriculums at the three CAA's. They enable the instructors to teach basically the same academic subject matter at the CAA's in three different geographic locations.

The goal of the CAA's is to train moniteurs d'Agricole to be capable of teaching rural farmers to adapt innovative farming practices proposed by the Operations. Thus, the CAA courses must offer up-to-date knowledge in animal husbandry, agronomy, agriculture economics, rural sociology, horticulture and other disciplines that are applicable to Malian agriculture. If this goal is to be maintained, the abstract concept of the present agricultural education delivery system should be redirected towards a competency-based vocational education delivery system. Hence, the development and deployment of competency-based curriculum materials must be emphasized for effective training of moniteurs d'Agricole.

The USAID/Bamako library contains a number of new and up-to-date tropical agriculture volumes written in the french language that could be a valuable resource to CAA instructors. According to the USAID librarian, the library is open to the public and the CAA instructors are welcome to use the USAID library facilities. In addition, the books may be borrowed by the instructors for limited periods of time. Most of the volumes are not oriented towards Malian agriculture, however, new ideas and concepts applicable to Mali can be obtained from such books.

Peace Corps/Mali library contains a limited number of tropical agriculture volumes that could also be a valuable resource to CAA instructors. According to the Peace Corps/Mali director, CAA instructors are welcome to use what books they have available. These volumes are written

in the french language and are oriented towards Malian agriculture.

There appears to be a number of Malian research publications available from various donor nation projects, Operations, Ministry of Agriculture and other sources. However, there seems to be no linkage between these various programs to permit such valuable information to filter into the CAA curriculums. Such information is of particular importance to the CAA Agricultural and Extension education programs. Due to the very nature of the data, these reports and publications reflect current Malian agriculture research findings and trends. Providing Malian agricultural research publications to CAA libraries would greatly enhance the access of current Malian agriculture information to both the CAA instructors and students.

#### Observe and Evaluate Instructors Classroom Teaching Strategies at CAA/Samanko

Traditionally, the teaching strategies implemented at the CAA/Samanko evolved from the french educational system. Within this particular educational system, basic training methods appear to stem from the aforementioned ILO booklets using the lecture-teaching strategy.

The lecture-teaching method is the "teaching by telling" technique. It can allow and encourage students to ask questions, interject ideas, indicate impressions and relate experiences during the lecture period. The lecture method is best used for situations where (1) the subject is simple, (2) new material is being introduced, (3) an experience is being described, (4) time is limited, and (5) a lesson is being summarized. However, this particular teaching strategy should be used infrequently in competency-based agricultural education programs.

The aforementioned consultant observed the following five classes at CAA/Samanko:

##### 1. Travaux Pratique

2. Agriculture Generale
3. Zootechnie Generale
4. Vulgarisation
5. Elevage

The lecture-teaching method dominated the formal classes and the direct purposeful experience teaching method dominated the Travaux Pratique classes.

The "Agriculture Generale" class lesson was entitled "The Use of Chemical Fertilizer and Animal Manure as Plant Food." This class lasted two hours in length with no break.

The teaching strategy included lecture only with only seven questions asked by the instructor and seven student responses. The seven responses involved only four different students. There were 28 students in the class, hence, 24 students did not interact with the class or instructor during the duration of the two hour class. After one and a half hours into the class, the attention span of the students rapidly declined.

The zoology class consisted of 29 students in the classroom. The instructor was administering an exam to the students by writing one question at a time on the blackboard, read it aloud twice and permitted the students 5-10 minutes to write their response on paper. Each question was erased from the blackboard before the next question was written. The examination consisted of ten questions having a two point value for each question.

The grading system is based on the French system with a perfect score being 20 as opposed to 100 in most traditional grading systems in America.

Following the completion of the written phase of the examination, the instructor collected each student's paper and then proceeded to discuss each question. There was a great deal of interaction between the students and instructor. Nineteen different students either asked questions or answered questions following the exam. It was obvious that anxieties of students were high and were eager to respond.

The honesty of each student appeared to be commendable. Each classroom desk had a seating capacity of two persons. The desks were all occupied with no vacant spaces between students. Only on three occasions were students observed looking at another student's written answers. However, in each case they looked only after writing their own answer and none changed their answer afterwards. Many of the students turned their papers over after their response to the questions.

The "vulgarisation" class consisted of 28 students. The teaching strategy used in this class was essentially verbal in nature, however, the instructor had much more interaction taking place among the students, and between students and instructor. A student stood in front of the classroom and read aloud from his notebook key points of the lesson. The instructor would interject questions and raise issues for the class to respond, then walk to the back of the room while students responded. During the class all but three students participated in the class discussions.

Students in the "vulgarisation" class appeared to be more relaxed and more eager to participate. This characteristic could be attributed to the less rigid atmosphere created by the teaching strategy used by the instructor.

The "elevation" class consisted of 28 students. The major objective

of the lesson was to learn the concept of making silage as a livestock feed and using pit silos as a storage facility. The learning activities included lecture and limited use of the blackboard. No application of the lesson was observed. The instructor did nothing to determine if students achieved the lesson objectives in class or following the class. Perhaps the use of a pre-test and post-test would have been beneficial to assess the students' attainment of lesson objectives.

Instructor had the lesson so well planned that he deviated little from his plan causing the classroom atmosphere to be rigid. Instructor had excellent control of class and related well with the students. The interaction between students and instructor was good, however, little interaction between students existed.

Students wrote good notes. They wrote what the instructor read to them from his notes. The students used two "bic" ballpoint pens, red and blue. Red pens were used to write the main and sub-headings and blue for the content.

The class was two hours in length with no break. Perhaps the attention span would have been enhanced if a ten minute break were given at the end of the first hour.

A pit silo existed at the cattle barn. The instructor may have been more effective if he would have used posters illustrating the various steps of digging a pit silo and making silage during the first hour. The second hour may have been more meaningful if the instructor would have taken the class to the existing pit silo at the barn for discussion and showing the "do's and don'ts" of digging the pit, chopping the silage, tramping the silage and closing the pit silo. A handout at the end of the class could have been more conducive to the learning process. A sample of silage

in the classroom or at the pit silo site for the students to see, smell, and feel may have contributed to achieving the lesson objective.

The objective of "travaux pratique" class is to provide students with an opportunity to acquire "hands-on" learning experiences. It is surmised that the students with the guidance and assistance of their instructors will apply what is learned formally in the classroom. The implementation of a practicum program into the formal curriculum is a noble characteristic of the overall CAA educational system. Baughman (1963, p. 100) supported the concept of practicum programs by writing:

"Learn to use your hands as well as your head! I am not belittling education, but the person educated entirely through books is only half educated. There is a kind of practical knowledge and good sense which can flow into the brain only through the use of the hands."

Seaman Knapp, known as the founder of the demonstration method for the Cooperative Extension Service in U.S.A., supports the concept by saying, "What I hear I forget, what I see I understand, what I do I know." Hence the "travaux pratique" program is purported to enhance the CAA formal classroom programs.

Vocational education is centered in the development of the individual through the activities of the vocation. Vocational educators have consistently reported that learning best takes place when the stage has been set in such a way as to provide opportunities for the desired experiences and learnings. The "travaux pratique" programs sets the stage to offer students the opportunity to "Learn by doing".

The "travaux pratique" class observed included two groups of students, one group worked at the cattle barn and one group worked in the sorghum fields. The "hands-on" learning experiences for the first group centered upon spraying cattle to control external parasites. Students

herded the cattle into a cattle chute and used a power sprayer to spray each animal. The instructor first explained the process of spraying cattle, demonstrated the technique and permitted each student to spray at least one animal. The students seemed eager to participate in the class activities. As each student performed their tasks, the instructor supervised and directed the class in a very organized manner to ensure that each student had an opportunity to participate. The instructor had complete control of the students during the class activities and no discipline problems were observed. It appeared the students had a great deal of confidence and respect towards the instructor. There was much interaction between the students and the instructor during two and one-half hour "travaux pratique" class.

The second group of students were cultivating five hectares of sorghum using short handled hoes. There seemed to be less enthusiasm and willingness to participate with this group. The instructor appeared to be "riding herd" on the students to get them to work. The objective of this class was to learn how to cultivate a field of sorghum by using a hoe. The students were lined up on one end of the field and they proceeded across the field hoeing the sorghum. There seemed to be little interaction between the students and instructor. The instructor did not have the control of the students as did the elevage instructor. There seemed to be laxity and disorganization of class direction.

The "travaux pratique" classes are divided into groups of 15 students ( $A_1, A_2, B_1, B_2$ ). Group(s) A participate in animal husbandry practicum activities and group(s) B participate in production agriculture practicum activities. Each group is rotated on daily basis to provide students with practical experiences in both animal husbandry and production agriculture.

Practicums begin at 0700 and end at 0930 five days per week and all day on Saturday. When the students are excused from their "travaux pratique" class they are given 30 minutes to return to their dormitories to wash, change clothes, and walk to their formal educational activities.

At the termination of four formal classes, the consultant reviewed each of the instructors lesson plan. In each case, the instructors' lesson plans were well documented using the following format. These four instructors at CAA/Samanko are to be applauded for their efforts towards organizing their lessons. During the teaching process, the instructors tended not to deviate from the format of their lesson plans. However, the lessons observed appeared to "dovetail" nicely into the aforementioned curriculum.

The lesson plan format used by all of the instructors at CAA/Samanko was commendable. According to DNFAR officials, the lesson plan format is identical at all the CAA's. The following example provided by DNFAR is a "Fiche Pedagogique" taken from an instructor notebook at CSR/Dioro:

C.S.R./Dioro

Fiche Pedagogique

Modele I

Cours: Hydrologie

Titre: Meteorologie et climatologie

Objet: Connaissance du materiel meteorologique et de son utilisation pratique dans unelstation.

Sencibilisation: Quele sont les appareils d'une station meteorologique et les grandeurs mesurees?

Deroulement du Cours

Experience Collective 1. Donnees techniques

(Travail de sensibilisation) 1. (voir fiche Modele II)

Materiel Necessaire: Appareils de la station C.S.R.

Temps a Prevoir: 3 heures

Travail D'Aplication: Releve des differents appareils de la sation du centre a tour de roles.

## Fiche Pedagogique

Modele II

Cours = hydrologie	Date	Heure
<b>Points cles</b>	<b>Observation pedagogique</b>	
<b>Meteorologie et climatologie</b>	<b>Methodes</b>	<b>Temps</b>
a) <u>Definitions</u> climatologie Meteorologie	Travail de sensi- bilization en groups	45 mn
b) Importance - Les plantes se develop- pent dans l'air ont besoin de chaleur d'eau		
c) <u>Grandeurs en Metro</u>		
1°) <u>La Pluviometrie</u> Pluviometrie, pluviographie, oeuvre de pluie		
2°) <u>Temperature</u> Thermometre (a alcool, mesure ou ressort) Thermometre; echelle de + centi- grade defini Par la t <sub>i</sub> de la glace fondante 0 °C Le t <sub>i</sub> de l'eau bouillante = 100° Fahrenheit + 32 °F = 0° C Re unur $\frac{C}{100} = \frac{R-F-32}{80 \cdot 180}$  + 212 °F = 100° C Temperature minima maxima	Recreation	15 mn  15 mn 60 mn
3°) <u>La Pression</u> Barometre-Barographe-pression atmosphérique Normale = 760 mm de mesure ou 10:3 ou 1,033 kg 1 cin ou une atmosphere		
4°) <u>Evaporation</u>  Evaporation: mm Evapore par jour	Montrer ou des- siner les divers appareils	
5°) <u>Humidite</u> Hygrometre-hygrographe (a cheveux) %		
6°) <u>Vent</u> Anemometre donne la direction du vent et sa vitesse		
d) <u>Installation of exploitation d'une station metre</u> Mesures regulieres a une hauteur stan- dard (1,5m) du sol dans un espace degage d'arbre et de maisons (15 a 20mn)		
	Resume	45 mn.
	Total	180 mn.

The course description provided by DNFAR for each of the disciplines are illustrated on the following outline:

En Agriculture Generale - 1 ere Annee

1. Etudes des Sols
2. Fertilisation des Sols
3. Travail, Aménagement, Utilisation des Sols
4. Multiplication et Amélioration des Vegetaux
5. Conditionnement des produits et Industries Agricoles.

En Agriculture Speciale en 2 eme Annee

1. Cultures vivrieres: Cereales  
Legumineuses  
Plantes a tubercules
2. Cultures industrielles: Plantes textiles  
Plantes oleagineuses  
Plantes sacchariferes  
Plantes stimulantes
3. Cultures Fruitières: Agrumes, manuliers, bannaniers, dattiers, goyaviers, papayer, ananas, avacatier, anarcardier.
4. Cultures Maricheres: Legumes feuilles, Legumes racines, Legumes Fruits.
5. Cultures Fourrageres: Generalites, conduite des cultures fourrageres, espece bontanique. Influence des plantes fourrageres. Creation des prairies et cultures fourrageres exploitation des paturages et culture fourragers..
6. Sylviculture: Generalities  
Essences forestieres utiles au Mali.(Recolte et usage)
7. Cultures Ornementales: Generalities  
Plan et travaux

En Economie 1'ere et 2e Annee

- 1'ere annee: Economie generale: Objet des Sciences economiques  
Theorie de secteur  
Facteurs de la production agricole  
Facteurs demographiques  
La monnaie et les prix  
Le capital  
Travail e parsn investissement  
Credit et banque  
Credit agricole  
Circuits economiques

En 2<sup>eme</sup> Annee: Economie Rurale: Definition

Exploitations artisanales  
 Etudes economique des exploitations  
 agricoles  
 Gestion et comptabilite des exploita-  
 tions agricole.

En Vulgarisation 2<sup>eme</sup> Annee :

1. Introduction a la Vulgarisation agricole
2. Les methodes de vulgarisation rurale
3. Sociologie et Sociometrie
4. Facteur Socio-culturel de la vulgarisation
5. Organisation du travail en vulgarisation
6. Etude de poste de l'argent de vulgarisation

En Protection Des Vegetaux 2<sup>eme</sup> Annee

1. Les ennemis des cultures
2. Les maladies des cultures
3. Les techniques de traitement
4. Les maladies parasitaires
5. Lutte contre les mauvaises herbes

En Botanique 2<sup>ere</sup> Annee

1. Anatomie et physiologie des plan Programmes
2. Systematique
3. Ecologie Vegetale

En Zootechnie generale 1<sup>ere</sup> Annee et Speciale 2<sup>eme</sup> Annee

1. Anatomie
2. Physiologie
3. Connaissance du betail
4. Elevage et reproduction
5. Alimentation du betail
6. Hygiene
7. Production d'orgine animale

En Enseignement General

1 Ere Annee Redaction niveau 8 9<sup>o</sup>  
 Orthographe  
 Mathematiques fonctionnelles

2<sup>eme</sup> Annee Redaction de 9<sup>e</sup>  
 Orthographe de 9<sup>e</sup>  
 Mathematiques fonctionnelles

En Topographie 1 ere et 2<sup>eme</sup> Annee

1. Elements de Topographie: Mesures elementaires de longueur  
 Mesures des Angles  
 Mesures elementaires des hauteurs
2. Les Levers Ruraux: Notion sur les coordonnees  
 Execution d'un lever planimetrique  
 Execution des leviers ruraux  
 Verification des mesures  
 Calcul des surfaces  
 Lotissements  
 Calcul des surfaces par la methodee angulaire

En Machinisme Agricole 1 ere et 2<sup>eme</sup> Annee

1. Machinisme elementaire
2. Les moteurs
3. Les compes
4. Les machines a elever l'eau
5. Les moyens de distribution
6. Les differents types d'installation

En Travaux Ruraux 1 ere Annee et 2<sup>eme</sup> Annee

1. Programme Theorique de travaux ruraux  
 Notions elementaires de maconnerie  
 Travaux Pratiques de maconnerie
2. Ateliers Metaux et bois
3. La traction bovine
4. Note technique pour la constitution d'un herbier

En Travaux Pratiques 1<sup>ere</sup> et 2<sup>eme</sup> Annee

1. Travaux Pratiques d'Agriculture:

Preparation du lol: Labours, hersages fumure organique et minerale.

Entretien: binnage, sarclages, buttages, traitement phyto-sanitaires

Recolte: Variable suivant les cultures

Entreposage: Stockage

Discussions with the director and instructor at CAA/Samanko reflected a sense of pride of their school, job, and their work. They appeared to be enthusiastic and dedicated to their profession.

The apparent seriousness of the students towards their studies was praiseworthy. They appeared to be very attentive in class, took notes, showed respect towards instructor, and absolutely no discipline problems were observed in the classroom before, during, or after class. Not one time was the instructor interrupted due to student misbehavior. When a student wanted to ask a question or respond to a question, he/she first clicked their fingers to get the attention of the instructor, when recognized by the instructor, they stood up, then spoke and remained standing until the instructor indicated to the student to sit down. When a guest walked into the classroom, the entire class immediately stood up and remained standing until instructed to sit down.

The students seemed eager to talk with the consultant following each class session. There appeared to be little interaction between the instructor and students after the formal class presentations.

Curriculum Materials and Visual Aids Workshop:

A great deal of pedagogical effort is required to render the information necessary to effectively implement new teaching methods, instructional materials, and visual aids. The efforts of the CAA instructors to develop teaching materials requires an exchange of ideas between CAA instructors, CAA directors, DNFAR officials, USAID, and World Bank technical assistants through a series of workshops. It is imperative that the thrust of teaching materials development be centered upon utilizing

local resources and talents. During the implementation of the workshop series, the instructors should learn how to design their teaching methods around innovative instructor made teaching materials and visual aids.

A four-day model curriculum materials and visual aids workshop was conducted by said consultant on August 6,7,8, 10, 1981 for DNFAR officials responsible for teaching pedagogical skills to all instructors in the CAA system. The workshop objectives were aimed at developing teaching materials and visual aids using local resources and talents.

The objectives of the four-day workshop included the following:

1. Teach workshop participants how to develop innovative teaching materials and visual aids using local resources and talents.
2. Introduce the use of alternative teaching methods to attain teaching objectives.
3. Emphasize the adoption of curriculum materials to Malian Agriculture.
4. Emphasize that CAA instructors develop their own curriculum materials with the support of DNFAR.

The aforementioned workshop consisted of three phases. Phase one included the following:

1. Introduction
2. Abilities needed by the instructor to teach agriculture
3. Major problem objectives
4. What makes a good objective
5. Student performance objective
6. Course of Study
7. Course of study components
8. Instructional organization, content and strategy components
9. Preparing a unit plan outline
10. Suggestions for learning activities

Phase two included the following:

1. Choosing strategies
  - a. Verbal symbols
  - b. Visual symbols
  - c. Still picture
  - d. Exhibits
  - e. Motion pictures
  - f. Field trips
  - g. Demonstrations
  - h. Dramatic presentations
  - i. Construed experience
  - j. Direct purposeful experience (travaux pratique)
2. Instructional materials and their development
3. Use of instructional materials
4. Storage of instructional materials
5. Development of instructional materials
6. Acquiring necessary materials, equipment, and supplies for developing curriculum materials and visual aids.
7. Types of instructional materials

Forty-three different examples of teaching materials and visual aids using local resources and talents were presented at the workshop. To more directly involve those in attendance in the learning process, the consultant explained how to do it, demonstrated how to do it, and permitted each individual to do it.

Phase three included the following:

1. Introduction of alternative teaching methods.
2. Detailed explanation of the following teaching methods:
  1. Lecture--discussion
  2. Team-teaching approach
  3. Resource person
  4. Laboratory instruction
  5. Interview
  6. Independent study
  7. Group discussion
  8. Forum-lecture
  9. Field trip
  10. Direct Purposeful Experience
  11. Research Method
  12. Seminar
  13. Symposium
  14. Panel discussion
  15. Project method
  16. Case study
  17. Brainstorming
  18. Committee (study group)
  19. Debate
  20. Demonstration
  21. Dialogue

Each of the teaching-strategies (methods or techniques) were explained in detail how they could be implemented into the structure of the existing CAA programs. Choosing which strategy to use to most effectively to attain various lesson objectives was discussed.

### Recommendations

A comprehensive CAA program of Malian agricultural education should do the following:

1. Assist Malian citizens to develop the attitudes, understandings and abilities regarding agriculture necessary for their future welfare and the welfare of agriculture.
2. Develop understanding of interrelationships of agriculture on other segments of the Malian society.
3. Develop understanding of the contributions of agriculture to Republic of Mali.
4. Develop appreciation of Mali's rural heritage.
5. Develop understanding of the influence of agricultural research on Malian agriculture.
6. Develop understanding of the influence of GRM policy on agriculture.
7. Promote creative learning activities for students.
8. Assist in improving the economic efficiency of Malian farmers.
9. Promote meaning and practical applications of the content of other subject matter areas, such as science.
10. Provide guidance regarding the occupational opportunities in Malian farm and in non-farm occupations requiring knowledge and skill in agriculture.

For effective change to be realized, it is imperative that a careful analysis of the teaching program now in progress bring to light the program strengths, its successes, and its accomplishments. Then within the framework of the principal strengths of the CAA programs, integration of new teaching techniques, instructional materials, visual aids, and curri-

culum adjustments can be slowly implemented. The following are suggestions for consideration by DNFAR officials, CAA directors, and instructors:

1. The agricultural education curriculum should be oriented towards Malian agricultural systems.
2. Curriculum should provide students with opportunities for learning realistic situations that exist in the field.
3. Implement competency-based curriculum materials into curriculum.
4. The agricultural curriculum should reflect the role of Malian women in agriculture production.
5. Extension education should be an integral part of all CAA disciplines.
6. The subject matter in each course should be oriented towards actual Malian trends and issues.
7. The CAA farms should be the competency-based agricultural education laboratories.
8. Practicum activities should emphasize Malian agricultural systems currently being used at the village level.
9. Practicum activities should be relevant to formal classroom activities.
10. Practicums should have established goals and procedures.
11. Practicum instructors should systematically measure the psychomotor performances of each student.
12. Classroom instruction should be coordinated with the appropriate agricultural activities taking place in Mali's various regions (i.e. soil preparation, planting, spraying)
13. Instructor teaching strategies should include an explanation of the task, and an evaluation of each student's task performance.

14. Lesson plans should be more competency-based with emphasis on the psychomotor skills.
15. Competency-based performance scores should be recorded by instructor and student for future reference.
16. Instructors should consider using alternative teaching techniques in the classrooms.
17. Instructors should conduct themselves as model moniteurs d'Agricole.
18. Instructors could refer to actual case studies and use actual data when offering instruction on finances and credit.
19. CAA instructors should make more use of Malian or foreign national resource people in their classes.
20. Instructors should consider redirecting their lesson plans from the abstract idealistic approach to a more realistic pragmatic teaching approach.
21. Students should be trained how to systematically identify the characteristics of the social structure within a community and how they affect agricultural production.
22. Students should learn how to methodically identify agriculture related problems in a village or community.
23. Students need to learn how to evaluate agricultural related problems.
24. Students should learn the appropriate steps and alternative steps of implementing a change process.
25. Students need to be competent in proposing solutions to problems found among village farmers.
26. Instructors and students should be competent in reading and interpreting Malian research reports.

27. Students should be competent in translating Malian agricultural research results to village farmers.
28. Students should be taught how the Malian marketing systems work and how farmers can best utilize the existing markets.
29. Instructor should share ideas in the design of teaching materials.
30. Emphasis should be placed on instructors making their own teaching materials from local resources.
31. DNFAR should consider providing each CAA with supplies and equipment to enable instructors to make, reproduce and store innovative teaching materials and visual aids.
32. Students should be encouraged to learn innovative techniques making teaching materials from resources available in the localities they are assigned. Commercially produced materials are indispensable, however, they are not always available to moniteurs d'Agricole at the village level.
33. Inservice education programs for CAA instructors should be conducted periodically.
34. CAA instructors should be observed and evaluated periodically by a teacher educator using an accepted criteria for evaluating pedagogical skills.
35. CAA instructors should be provided with criteria that will be used to evaluate their teaching performance.
36. Periodic meetings with CAA instructors, directors and DNFAR officials can provide opportunities for an interaction of ideas to enhance the pedagogical competencies needed by those concerned with training moniteurs d'Agricole.

37. DNFAR officials should create a direct and/or indirect linkage with Malian Operations, Ministeries, foreign donor projects, and others to allow current pertinent information and research results to filter into the CAA programs.
38. A reference library containing current books on agronomy, animal husbandry, horticulture, soils, genetics, forestry, field crops, extension methods, and many other tropical agriculture disciplines. Malian research reports and appropriate periodicals should be promoted at each CAA for students.

## ISSUES FOR CONSIDERATION

1. In United States of America, considered by many as one of the most advanced societies in the world, new theories of learning are not usually readily accepted by the vast majority of educators in educational institutions. Typically, according to Bigge and Hunt (1962, p. 277), "...a new theory of learning is not translated into school practice until 25 to 75 years have elapsed. Then, as a new theory eventually comes to affect school policy, it usually does not replace its predecessors; it merely competes with them." Should this concept be also applicable to educational institutions in developing nations the following questions need to be addressed:
  - A. Is it feasible to convince DNFAR officials, CAA directors and CAA instructors that it will benefit their agricultural and extension education programs if they change their teaching theories, philosophies, strategies, and curriculums from the french system to an American system?
  - B. Can a USAID technical assistance team realistically cause a change process to be implemented in a two year period of time?
  - C. What effect will an accelerated change process have on CAA students who are accustomed to the french educational system?
  - D. Will the CAA instructors and students readily accept the new teaching strategies in such a short period of time?
  - E. Will there be ample time to cope with the anticipated resistance that is normally associated with a change process?
  - F. Can the introduction of and effective change process cause permanent change to take place at the CAA's in two school years?

2. In a broad sense, vocational education in America contemplates all levels and types of productive work, from semiskilled occupations involving relatively narrow ranges of skill and technical knowledge, to the professions which call for extensive university study. Vocational education is for all who must provide a livelihood for themselves and their families. Hence, are the American competency-based vocational agriculture education concepts applicable to the Malian schools of thought, educational systems, and the employment patterns of educated Malian clientele?
3. The most critical assumption underlying this project, and upon which little research has been gathered, is to what extent improved extension services affect farmer productivity. It is only assumed that improving the process by which information is passed on to farmers will eventually result in increased crop production. It is anticipated that with a sufficient input of technical assistance, combined with participant training will ultimately result in increased agricultural output. Is this a valid and/or reliable basis to deploy project personnel and funding?
4. Educational programs must be responsible for the results produced in the intended learners. This responsibility is not accomplished simply by asserting that it is so, but rather it requires evidence regarding the outcomes produced in the learners as a consequence of instruction. First and foremost, then, educators are accountable to learners. Accountability is also demanded by the occupation for accuracy of the job-related training. Are DNFAR officials, CAA directors, and CAA instructors prepared and/or willing to accept the responsibility of being accountable to their clientele?

5. McCormick (1980, pp. 9-10) described five easy steps to implement a competency-based curriculum into an agricultural education program.

Those five steps are:

- A. Set a goal and make a solid commitment to initiate a competency-based instructional program.
- B. Identify a list of agricultural and leadership competencies one plans to teach in the course of study, by years. Reproduce and distribute this list to students. Refer to this list continuously.
- C. Develop and utilize a system for recording the competencies taught to students.
- D. Develop an evaluation scale for each competency taught which will indicate the degree of mastery of the specific competency.
- E. Design a reporting system (or procedure) for reporting and recording actual competencies taught in the instructional program by years.

McCormick concluded by saying:

"...provide objective evidence of what students are actually taught. Accountability of the program, in part, will be in the recorded evidence. Graduates of the program, when asked, 'What can they do?' will be able to share with the potential employers what they can do, as well as provide an indication of how well they can perform each competency gained."

If the five steps are applicable and adaptable to the Malian agricultural and extension education programs, the following are concerns that need to be addressed:

- A. Can DNFAR with the help of USAID and World Bank technical assistance teams effectively and realistically revise an

- existing CAA curriculum to adapt a competency-based agricultural and extension education program within a two year time frame?
- B. Will DNFAR officials, CAA directors and CAA instructors make a solid commitment to initiate a competency-based instructional program? If yes, will the DNFAR commitment continue after the USAID project support has been phased out?
  - C. Can a valid list of agricultural and leadership competencies be identified and implemented into a course of study within a two year time frame?
  - D. Will a reporting system (or procedure) for reporting and recording actual competencies taught in the instructional program pose a professional threat to instructors?
6. Competency-based curriculum materials are an attempt to answer a specific need of educators involved with competency-based agricultural education. The key to arranging competency-based agricultural instruction so that clientele can work at their own rate according to Nagel (1972) "...is in having materials available that carry the burden of doing the teaching and remediation. This frees the teacher from the traditional constraints of his role and allows him greater freedom...to participate actively on an individual basis with his students." If competency-based curriculum materials are applicable to the CAA curriculum, the following queries need to be addressed:
- A. Will CAA instructors accept and use such materials?
  - B. Will CAA instructors allow such curriculum materials do the teaching?

- C. Will there be ample DNFAR support to enable competency-based materials to be reproduced?
- D. Will there be ample facilities, equipment, supplies, and other resources available to properly and effectively implement a competency-based agricultural and extension education program at each CAA?
- E. Will the CAA instructors develop their own competency-based curriculum materials after being trained how?
- F. Will CAA instructors adjust their teaching strategies to allow each student to progress at their own rate?

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