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ABSTRACT

These guidelines have been prepared to assist educators, school planning personnel, architects, and other concerned individuals in developing facilities for programs of agricultural education in senior high school and post-high school settings. Major sections include: (1) Statement of Philosophy, (2) Major Program Objectives, (3) Instructional Areas in Agriculture Education, (4) Organization of Programs of Instruction in Vocational-Technical Agricultural Education, (5) The Setting Required for Teaching Vocational-Technical Agriculture, (6) Relationships of Instructional Spaces within the Agricultural Complex, (7) General Spatial Requirements for Programs of Vocational-Technical Agriculture, (8) Specific Spatial Requirements and Physical Facilities for Programs of Vocational-Technical Agriculture, (9) Services and Utilities, and (10) Environmental Factors. The educational progression of entry into various agricultural occupations through difierent instructional programs and settings and the relationships of instructional space within the agricultural complex are illustrated. A guide to the relative amount of time different areas of instruction will use different instructional spaces within the physical plant is presented in tabular form. (DM)

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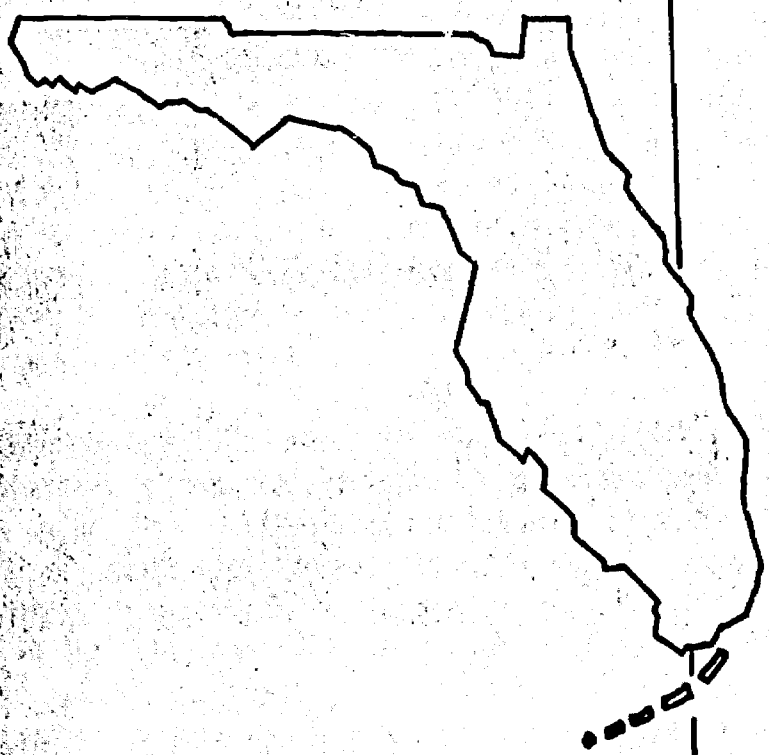

GUIDELINES FOR PREPARING EDUCATIONAL SPECIFICATIONS FOR AGRICULTURAL EDUCATION

THE STATE DEPARTMENT
OF EDUCATION

Floyd T. Christian
State Superintendent

TALLAHASSEE, FLORIDA

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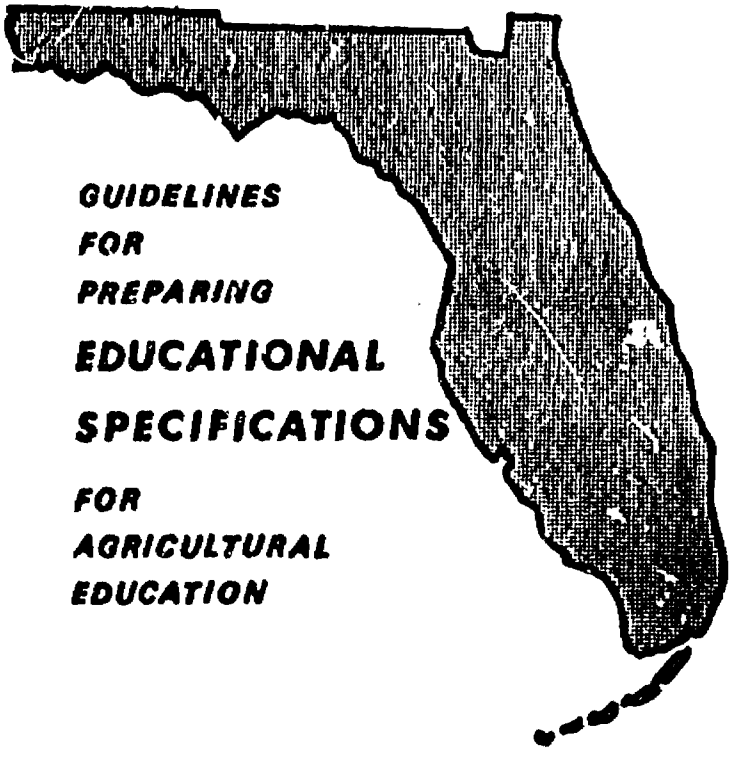

GUIDELINES FOR PREPARING EDUCATIONAL SPECIFICATIONS FOR AGRICULTURAL EDUCATION

DIVISION OF VOCATIONAL, TECHNICAL, AND ADULT EDUCATION

CARL W. PROEHL, Assistant Superintendent

AGRICULTURAL EDUCATION SECTION

C. M. Lawrence, Director

PREFACE

These guidelines relating to educational specifications have been prepared to assist educators, school plant planning personnel, architects, and other concerned personnel as they develop facilities for programs of agricultural education in senior high school and post high school settings. These programs are for all persons with an aptitude for and interest in entry or continuing involvement in Florida's agricultural industries.

Additional copies of these guidelines may be obtained by interested persons from the following address: Agricultural Education Section, Division of Vocational, Technical and Adult Education, State Department of Education, Room 275, Knott Building, Tallahassee, Florida 32304

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STATEMENT OF PHILOSOPHY

We believe in the worth and dignity of the individual. We believe he possesses the potential to develop the necessary appreciations, attitudes, abilities, skills and understandings essential for vocational success in agriculture. We further believe in a dynamic and improving agriculture and in its basic importance to our society.

To implement these basic beliefs, we believe that we should devote our attention to the education, enlightenment, and encouragement of the individual so that he might equip himself to meet both his vocational and his civic responsibilities to the limit of his capabilities. Individual work, group participation, practical experience, problem solving, and combinations of these activities are means used for attaining these goals.[1]

MAJOR PROGRAM OBJECTIVES

We believe that the major objectives of our program, based on the philosophy above, should be to assist the individual student in preparing himself for establishment in agriculture, either on or off the farm, whether it be through regular high school instruction in agriculture, instructional programs for persons with special needs, post-high school terminal instruction in agriculture, continuing out-of-school instruction, completion of further work leading to a college degree, or combinations of these programs. Stated more specifically we believe that the following are the major objectives of vocational education in agriculture:

1. To develop agricultural competencies needed by individuals engaged in or preparing to engage in production agriculture.
2. To develop agricultural competencies needed by individuals engaged in or preparing to engage in agricultural occupations other than production agriculture.
3. To develop an understanding of, and appreciation for, career opportunities in agriculture and the preparation needed to enter and progress in agricultural occupations.
4. To develop the ability to secure satisfactory placement and to advance in an agricultural occupation thorugh a program of continuing education.
5. To develop the abilities in human relations which are essential in agricultural occupations.
6. To develop the abilities needed to exercise and follow effective leadership in fulfilling occupational, social and civic responsibilities.[2]

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[1]Adapted from Curriculum Guide For Constructing Courses in Vocational Agriculture For Florida Schools, State Department of Education, 1966, p V.

[2]Adapted from Objectives For Vocational And Technical Education in Agriculture, Bulletin OE-81011,, US Department of Health, Education, and Welfare, Office of Education, 1965, pp 4-5.

INSTRUCTIONAL AREAS IN AGRICULTURAL EDUCATION

Agricultural Production - Subject matter and learning activities (experiences) organized to provide principles and practices in the production of livestock, field crops, fiber and oil crops, fruits and vegetables on commercial and part-time farms. In addition to basic principles of plant science, soil science, animal science, agricultural mechanics, leadership, and farm business management, instruction specific to important productive enterprises is emphasized. Managerial and technical knowledge and skills taught involve the economic use of agricultural land, labor, capital, and management. The safe and efficient operation of modern farm equipment and the proper harvesting and handling of high quality products are emphasized since they are important for beginning workers.

Agricultural Supplies - Subject matter and learning activities organized to prepare students for entry as workers in occupations featuring the sale and service of those agricultural supplies needed by the agricultural producer with such sales and services requiring agricultural competencies on the part of the worker.

Agricultural Mechanics - Subject matter and learning activities organized to provide principles, knowledge, and skill in operating, marketing, and servicing agricultural power machinery and related equipment. Opportunities are provided for students to study and gain experience in assembly, adjustment, maintenance, and repair of agricultural machinery and in designing, constructing, and maintaining farm structures and conveniences. Students learn to use tools and to perform mechanical services.

Agricultural Products - Subject matter and learning activities organized to provide principles and operations involved in the preparation of agricultural products for use or sale. Subject matter pr[illegible] and experiences provided are organized under areas such as meat, poultry and eggs; dairy products; fruits and vegetables; cereal grains; and non-food products, i.e. wool, cotton, tobacco. Learning activities are provided in assembling, sorting, testing, grading, processing, storing, and marketing each agricultural product.

Ornamental Horticulture - Subject matter and learning activities organized to provide principles, knowledge, and skill in the production, management, sales, and service activities in greenhouses, nurseries, and garden centers, as well as with the establi[illegible]ment and maintenance of turf and landscape areas.

Agricultural Resources - Subject matter and learning activities designed to provide opportunities for students to study principles and processes dealing with the conservation, management, and improvement of resources such as forests and other natural areas, fish and wildlife, soil, water and air; and with the establishment, management, and operation of recreational facilities.

Forestry - Subject matter and learning activities concerned with teaching the management of trees grown as a crop. Areas included are production, protection, logging, wood utilization, recreation, and special products.

Other Agriculture - Subject matter and learning activities organized to provide preparation in specialized agricultural business services, education, inspection, regulation, and other private or governmental services ordinarily not included in the seven areas previously listed. Some students receiving instruction in this area might ultimately go on into professional careers in agriculture.

ORGANIZATION OF PROGRAMS OF INSTRUCTION IN VOCATIONAL-TECHNICAL AGRICULTURAL EDUCATION

Types of Programs

Instructional programs developed for each of the instructional areas listed above may be offered in a variety of institutional settings for different groups of persons having different needs. Such programs include the following:

1. Secondary Preparatory Programs - Vocational education for high school students regularly enrolled in a secondary school, area vocational school, or vocational-technical high school approved by the State Department of Education. A two-year basic course in agricultural science cutting across seven subject-matter areas is recommended. These areas are Orientation to Agriculture, Agricultural Management, Animal Science, Plant Science, Soil Science, Agricultural Mechanics, and Leadership. Courses for students in advanced agriculture are organized to provide instruction in specialized clusters of subject matter relating to occupational preparation in instructional areas commensurate with student and community needs.

2. Post-Secondary Preparatory Programs - Vocational education for persons who have completed or left high school, who are not employed full time in the labor force, and who are available for full-time vocational-technical study.

3. Adult Preparatory Programs - Ungraded vocational-technical preparatory courses of varying duration for persons who have completed or left high school. These courses require less than 900 hours for completion individually or as a combination of related short courses.

4. Supplemental Programs - Vocational education for persons who have already entered the labor market and who need training or retraining to achieve job stability or advancement in the occupation in which they are employed. This includes the traditional adult and young farmer class.

5. Programs for Persons With Special Needs - Persons who have academic, socioeconomic, or other handicaps and disadvantages that prevent them from succeeding in the regular vocational education program or from achieving maximum success in regular vocational classes without extensive individual attention.

Persons Served

Students served in different programs, at different levels of instruction, and in different institutional settings may be enrolled in junior high schools, senior high schools, comprehensive high schools, area vocational schools, and/or community colleges. Some may be adults whohave completed high school. Others may be adults who have been high school dropouts. Attendance of students in the different programs may be either on a full-time or a part-time basis. Length of class periods and length of courses may vary according to different needs.

Students in the different programs should be individuals whohave expressed an interest in preparing for an agricultural or agriculturally related career, are interested in becoming informed about the field of agriculture as a basis for making career choices, and who have aptitudes indicating they possess the potential for successful placement in some phase of agriculture.

Figure 1. on the following page is a flow diagram showing educational progression and entry into various agricultural occupational areas through different programs of instruction in various institutional settings for different persons.

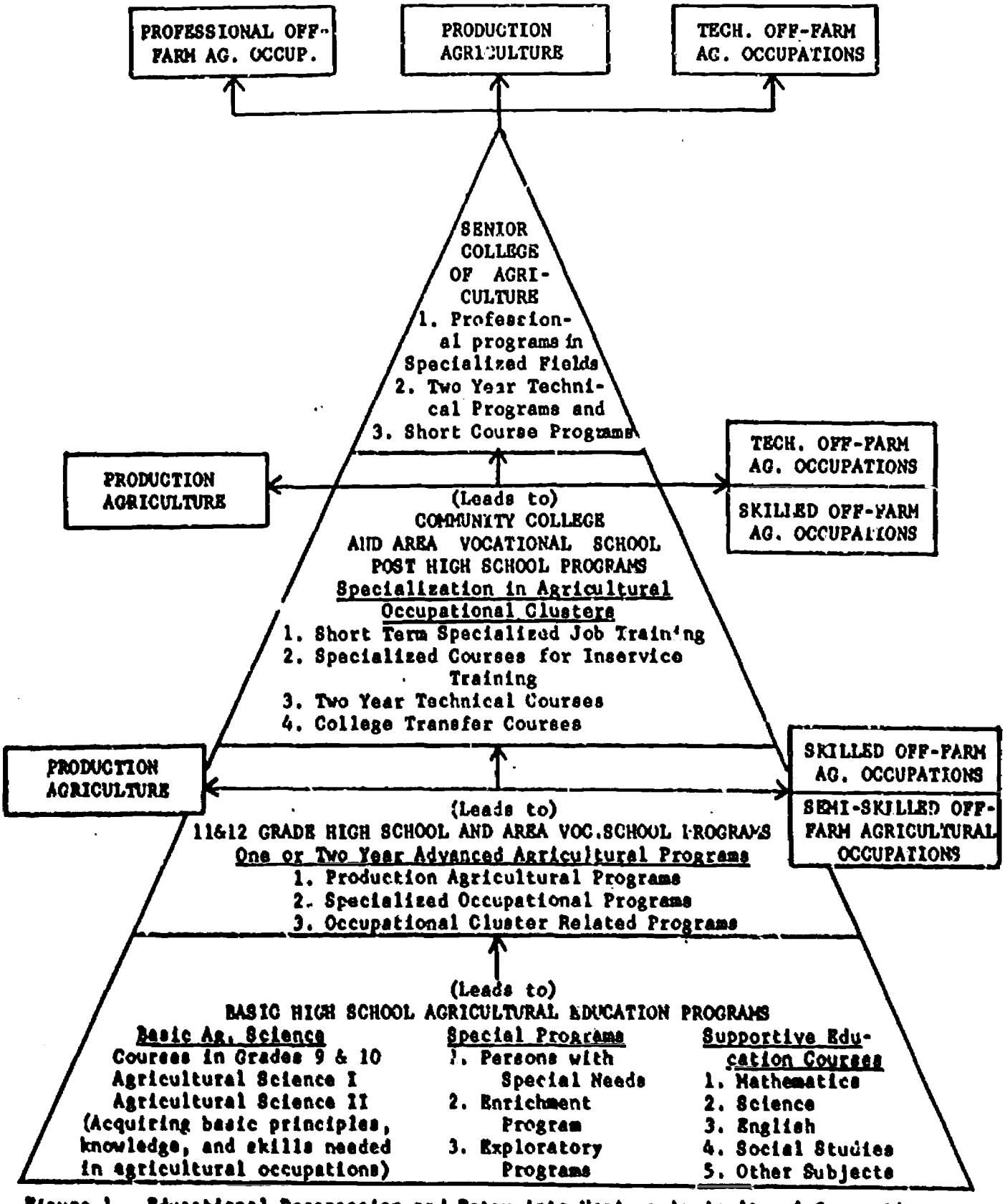

Figure 1. Educational Progression and Entry into Various Agricultural Occupations Through Different Programs of Instruction in Various Institutional Settings (Developed by C. M. Lawrence, Director, Agricultural Education, State Dept. of Education, Tallahassee, Florida 32304)

THE SETTING REQUIRED FOR TEACHING VOCATIONAL-TECHNICAL AGRICULTURE

A. Several conditions and activities inherent in the teaching-learning process in agriculture will affect the design of the physical plant for programs of vocational agriculture:

1. The problem-solving approach will very often be utilized in the teaching-learning process. Consequently, small group planning and study sessions will take place where students will need to spread their work out for greater effectiveness in addition to instructional activities involving the entire class as one group.

2. Demonstrations in the classroom, agricultural mechanics shop, horticultural patio, and in the land laboratory will need to be given to small as well as to large groups.

3. On some occasions, it will be desirable to schedule two or more classes together at the same time at the same teaching station for instruction by one or more teachers. To develop effective leadership abilities, both small and large group activities will be necessary. The basic teaching load for one class utilizing one teaching station per instructional period should be 20 students per teacher. The number of students involved in small group instruction may vary from three to seven. Large group instruction would normally involve two classes or 40 students. For certain leadership activities and other occasions, it may be necessary to assemble all those enrolled in vocational agriculture at one time into one group totaling 80 or more individuals.

4. Different levels of attainment will be expected of students for different phases of instruction. Involved will be the development of knowledge, appreciations, understandings, abilities, attitudes, and ideals which will lead to vocational preparation. Consequently, teaching-learning activities will involve both the learning of basic principles as well as the application of principles in practice.

5. The learning of students in the classroom, agricultural mechanics shop and land laboratory is most effective when supplies, hand tools, and small equipment are stored close to the area in which learning activities are to take place.

6. Instructional programs will be developed for different groups of students wanting instruction at different times during the day and evening, and involving different blocks of class time. Departmental facilities will be made available to agricultural agencies in the community for educational purposes.

7. Flexible and/or modular class scheduling possibly could result in daily changes in levels of student attendance at the agricultural center; and during larger blocks of time, students may be assembled in two or more teaching stations in the agricultural center necessitating a smooth student traffic flow. It is possible that several levels of instruction involving several areas of subject matter will

be conducted at the agricultural center at the same time.

8. Supervised occupational experience programs are required as an integral part of programs of vocational-technical agriculture. These experiences may be provided at the student's home farm, the school farm, the school's agricultural mechanics shops, and/or training stations in commercial farms and ranches or related business and industrial concerns. Provision should be made for teacher-pupil conference areas and for facilities for specific individual study.

9. Due to the flexible nature of class scheduling possible, the various levels of instruction offered, and wide scope of subject matter covered in teaching, a heavy flow of traffic among different areas of the agricultural center will be commonplace. For example, common activities in ornamental horticulture would include propagation, fertilization, selection of media, potting, and other plant science skills in the horticultural patio; demonstrations and group instruction in the classroom; individual study and research in the resource center; and woodworking, small gas engine maintenance, electrical, and plumbing work in the general agricultural shop.

B. Activities in the Various Instructional Areas:

1. Activities in the classrooms will include large and small group instruction, individual study and/or research, demonstrations, class discussion, work - study sessions, laboratory exercises, lectures, student presentations, and the use of varied audio-visual media.

2. Activities in the resource center will include supervised group and individual study and research, individual and group conferences and discussions, and the preparation and use of audio-visual materials with a wide variety of teaching-learning resources available--such as slides, film strips, transparencies, specimens, reference books, bulletins and charts.

3. Office activities in which the teacher or teachers will be engaged include planning and preparing for teaching; developing course and unit outlines, lesson plans, instructional materials, and evaluation instruments; counseling students; supervising students' experiences in the acquisition of new operative and managerial abilities at school and on the farm or placement location; preparing reports and maintaining records; planning for and participating in general and departmental faculty meetings and other individual or group activities designed for the purpose of improving instruction. Secretarial services will be necessary and should be housed in this area.

4. Activities in the general agriculture shop will include woodworking, painting, tool conditioning, cold metal work, pipework, soldering, sheet metal work, arc and acetylene welding, plumbing, concrete and masonry work, electrification, hot metal work, small engine maintenance and repair, and project repair or construction.

5. Activities in the agricultural mechanics laboratory and related patio and/or work areas will include maintenance, repair, overhaul, calibration, cleaning, testing, painting, and set-up of farm power equipment and machinery. Extensive instruction in arc and oxy-acetylene welding will also take place.

6. Activities in the horticultural patio will include mist propagation, media selection, storage, mixing, sterilization, potting, plant culture, and retail sales.

7. Activities in the land laboratory could include such activities as crop and grove cultural demonstrations; fertilizer, insecticide, herbicide, and fungicide applications; small and large livestock care and handling; planting, transplanting, grafting, pruning, propagating, and other nursery or landscaping operations.

RELATIONSHIPS OF INSTRUCTIONAL SPACES WITHIN THE AGRICULTURAL COMPLEX

The schematic drawing appearing on the next page as Figure 2, is intended to depict the relationships of different instructional spaces within the agricultural complex to each other. Consequently, major traffic patterns to be considered are easily seen. The figure is not drawn to scale.

The time spent by students and instructors within these various instructional spaces will vary according to the type of programs provided. To assist in planning, Table I on page 10 has been developed as a guide to the relative use of time in these different instructional spaces within the physical plant for the different areas of instruction provided in various programs of vocational agriculture.

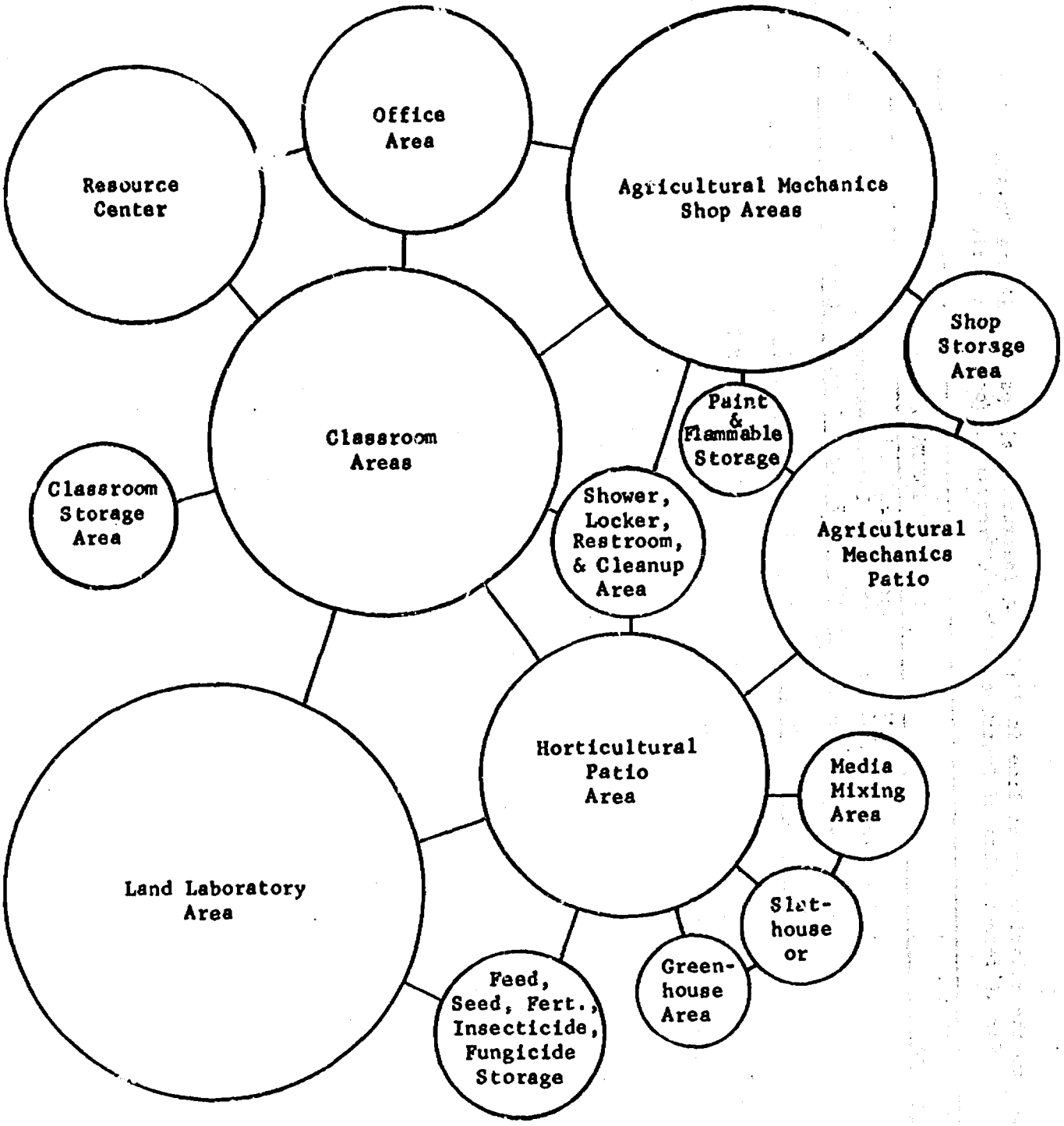

Figure 2. Relationships of Instructional Space Within the Agricultural Complex.

Guide to the relative use of Time in different Instructional Spaces with the Physical Plant for different Areas of Instruction in the Program of Vocational Agriculture

Area of Instructional Preparation	DIFFERENT INSTRUCTIONAL SPACES					
	Classroom	General Agriculture Shop	Agricultural Mechanics Laboratory & Patio	Resource Center	Land Laboratory	Special Instructional Facilities
	D B P A T	D B P A T	D B P A T	D B P A T	D B P A T	D B P A T
Agricultural Production	L E E E E	M M M M M	L L E E E	L M M M E	E M E L L	
Agricultural Supplies	M L M M L	L - L L L	L L L L L	L - E E L	L L L L L	
Agricultural Mechanics	L M M M M	E M E E M	M M E E E	L L M E E	M L M L L	
Agricultural Products	M L M M L	L - L L L	L L L L L	L - M M L	L L L L L	E L E L L
Ornamental Horticulture	M L M M M	M L M M L	L L M M M	L - E E E	E E E E E	E E E M E (Horticulture Patio)
Agricultural Resources	M L E M L	L L L L L	L L L L L	L - M E E	M L M M L	
Forestry	L L E M M	L - L L L	L L M L L	L - M E E	E L M M E	
Professional Agriculture	- L E E E	- L L L L	- L L L L	- M E E E	- M M M M	

Key: I. Amount of Time Space is Used

E - Extensive

M - Medium

L - Limited

II. Programs Served in each Instructional Space

D - Disadvantaged - Persons with Special Needs

B - Basic Agriculture I and II

P - Advanced Secondary and Post Secondary

A - Adult and Young Farmer

T - Technical

Table I

GENERAL SPATIAL REQUIREMENTS FOR PROGRAMS OF VOCATIONAL-TECHNICAL AGRICULTURE

To be effective and efficient, the classrooms, resource center, office, storage areas, agricultural shops, patios, and horticultural facilities for teaching vocational-technical agriculture should be designed an integral unit. A separate complex designed and constructed for the sole purpose of teaching vocational-technical agriculture is an ideal type of plant.

The building site should be close enough to the other school buildings so that students can get to their other classes without undue delay. It should be adjacent to a parking area, or better, a parking area should be provided in connection with the building. Natural or artificial screening of outside patio and/or work areas should be provided to create a pleasing setting for departmental activities.

It is desirable that the department of vocational-technical agriculture have a basic land laboratory suitable for teaching purposes adjacent to or near the agricultural center. Available acreage near the school plant is usually quite limited, but through long-range planning, school officials can often acquire necessary land for the department within reasonable transporting distance of the school or center.

SPECIFIC SPATIAL REQUIREMENTS AND PHYSICAL FACILITIES FOR PROGRAMS OF VOCATIONAL-TECHNICAL AGRICULTURE

A. <u>Classrooms</u>

1. Classroom size should range from 780 to 1,000 square feet for a class load of 20 students.

2. Permanent fixtures should include:

   a. A minimum of 18 linear feet of chalkboard

   b. A minimum of 32 square feet of tackboard

   c. A wall clock and bell system

   d. Provisions for darkening room for audio-visual presentations

   e. Projection screen

   f. Vertical notebook racks with a capacity for 80 standard 1½" size, three-ring notebooks

   g. Display cabinets

   h. Shallow, miscellaneous storage cabinets

   i. Shelving for readily available storage of books and other learning materials in current use.

3. Furniture:

   a. Ten two-man, work and study tables and 20 posture-type chairs.

   b. One library type table for current references.

   c. Teachers' general purpose classroom table with lectern or a tilting top mounted on casters.

   d. Portable audio-visual equipment stand on casters.

4. A single classroom will suffice for one-teacher departments. Additional teachers will need a second classroom. In this event, a sound resistant, folding dividing wall should be provided between the rooms to permit rapid transition of the two rooms into one large group instructional area.

5. Laboratory - demonstration classroom. One of the classrooms should be provided with hot and cold running water, an acid-proof sink, gas, and a portable laboratory demonstration table. The student tables in this room should be covered with an acid and soil resistant material.

6. Classroom storage space should not be taken from the available clear classroom space, but should be provided as separate, adjacent storage. This room should be large enough to store audio-visual equipment, teaching materials in classroom quantities, objects, models, specimens, and supplies used in classroom instruction. Built-in storage shelves, drawers, and cabinets should be provided.

   a. From 100 to 120 square feet for a one-classroom unit is recommended.

   b. From 200 to 240 square feet for a one-classroom unit is recommended.

B. <u>Resource Center</u>

1. A minimum of 320 square feet for a single teacher department and 400 square feet for multiple-teacher departments should be allocated for a resource center.

2. Permanent fixtures should include:

   a. A minimum of 18 linear feet of built-in ceiling to floor library materials space is needed, providing adjustable shelving for books and magazine racks; as well as storage cabinets for filmstrips, slides, transparencies, tapes, and other audio-visual materials.

   b: Carrels for individual study which include a viewing screen, should be provided.

3. Furniture:

a. Library study tables and posture chairs to serve ten students are needed.

b. Cabinets with inserts for storing indexed agricultural bulletins are needed.

C. Office Space for Teachers

1. Each teacher needs a work and planning area where he can develop curricular materials, develop lessons, counsel students, handle correspondence, prepare records and reports, and perform similar activities of a professional nature. A telephone should be available. Visual control of the classroom and agricultural mechanics shop from the office is needed. Provision for secretarial service to file bulletins, teaching aids, prepare letters, and duplicate materials should be provided.

2. It is recommended that office space provided for each teacher be approximately 140 square feet.

3. Furniture:

a. One executive desk and chair for each teacher.

b. Two visitors' chairs.

c. Two four-drawer legal-size filing cabinets for a one-teacher department, and one cabinet for each additional staff member.

d. One bookcase or built-in book storage area per teacher.

e. One secretary's desk with typewriter well and chair.

D. Agricultural Mechanics Areas

Two distinct areas might be developed in the agricultural complex, depending on local needs. Establishing both areas in the complex will provide a means of developing a comprehensive program in agricultural mechanics. These two areas are:

1. General Agriculture Shop and Related Patio:

Departments offering instruction in basic Agriculture I and II and in cluster areas of production, horticulture, and other specialities requiring limited related shop instruction should provide a general shop with attached patio. This facility will suffice for most high school programs.

a. The general agriculture shop should have a minimum of 2,800 square feet of interior floor space ranging to 3,600 square feet.

b. The shop should be of clearspan design, with an access door and

ceiling sufficient in size for entry of agricultural equipment and machinery common to the community and covered by the instructional program. Generally, this will necessitate a shop height of 12 feet. A clock and bell should be also installed.

c. A separate tool and supply storage room that can be locked should be provided. It should contain a minimum of 100 square feet of space.

d. Two-hundred square feet of shop storage should be provided. Separate racks for lumber, steel, and pipe will be needed. Decking over the tool room and clean-up area could provide some storage space, providing access stairs were made available.

e. An attached concrete floored patio surrounded by a bock wall or chain fence with a range in size from 2,000 to 3,000 ssquare feet will provide an outside work area, open storage for large equipment, and an equipment clean-up area. At least 100 square feet in or adjacent to this area should contain an enclosed room for outside storage of paints, thinners, cleaners, and other flammable liquids or materials. Some portions of the patio area should be protected by an enclosed roof. Provide a welding outlet in this area.

2. Agricultural Mechanics Laboratory and Related Patio:

Departments offering intensive instruction structured in blocked periods of time in the area of agricultural mechanics for programs such as farm machinery service occupations or specialization in areas such as farm power, agricultural hydraulics and agricultural machinery will require an agricultural mechanics laboratory with related patio. This facility will be especially addapted to area schools, high school programs for seniors, and post-high school students.

a. The agricultural mechanics laboratory will require from 3,200 square feet of interior space up to 4,200 square feet. In addition, similar consideration should be given to tool and supply storage areas as outlined previously for the general shop. In designing the agricultural mechanics laboratory and related patio area, attention should be given to the location of an access road, placement and width of doors, and height of ceilings in the laboratory due to the nature of heavy machinery that will be involved in the program of instruction.

b. The related patio will be a teaching station for painting, cleaning, engine testing, and machinery set-up and assembly. The floor covering should be concrete, enclosed by a block wall or chain-link fence, and the work areas should be roofed. The area should enclose a minimum of 2,400 square feet and could be as large as 3,600 square feet.

3. Combination Shop Programs:

Some departments will offer programs requiring both a general agricultural shop and an agricultural mechanics laboratory. An attached patio is needed in any case. The need for both facilities could develop in comprehensive high schools, but would usually be found in area vocational schools or community colleges.

a. Where both instructional areas are developed, welding and metal work could be taught in the agricultural mechanics laboratory, thereby reducing space requirements for the general shop. This innovation, plus an expanded patio will create three separate teaching stations. Spatial requirements under a combination program are as follows:

General Agricultural Shop	- Minimum 1,680 sq.ft. - 2,400 sq.ft.
Agricultural Mechanics Laboratory	- Minimum 3,200 sq.ft. - 4,200 sq.ft.
Related Patio	- Minimum 2,400 sq.ft. - 4,000 sq.ft.

b. Sufficient tool and supply storage areas as outlined previously will be needed in the combination shop approach.

E. Restroom, Clean-up, and Locker Areas

1. A restroom, clean-up, and locker area is needed to service the entire complex. Direct access should be provided from the shop and classroom areas. At least 400 square feet should be provided for this facility.

2. Permanent Restroom Fixtures Should Include:

   a. At least two stools and two urinals.

   b. Two wash basins.

   c. Four shower heads.

   d. Sufficient locker space equal to the full-time student enrollment.

3. Restroom for females should be accessible.

4. A storage area of 12 to 16 square feet for exclusive use of the custodian is recommended. This area should be separated from the classroom or shop storage areas.

5. An industrial gang type of circular wash and clean-up basin should be located in the shop. It should be separate from the other clean-up facilities.

F. Horticultural Patio

Departments offering extensive instruction in ornamental horticulture

will need a laboratory area for this activity. Although this may be a separate facility, it lends itself to inclusion in the building plan as an attached patio. The area should be paved with concrete, asphalt, or sand seal and enclosed with block or chain-link fence. Access must be provided for supply trucks.

1. An area ranging from 1,200 to 3,600 square feet will be needed for the horticultural patio.

2. Permanent structures needed will vary, based on the instructional program, but could include the following:

   a. Shade house

   b. Greenhouse

   c. Storage area for cans, tools, and equipment

   d. Soil media storage bins

   e. Potting bench

   f. Intermittent mist rooting beds

   g. Turf variety plot

   h. Processing and marketing area

3. A separate lockable, varmint-proof storage area for seed, fertilizer, insecticide, fungicide, and other supplies should be provided to serve the horticultural patio.

G. Land Laboratory

It is difficult to determine how much land should be used for land laboratory instructional purposes in the different school settings existing in Florida. For example, in areas where forestry or range livestock production is important, rather large acreages may be justified. On the other hand, three to five acres may be sufficient in an area of the state where vegetables, ornamentals, or specialty crops predominate. In general, the area should be sufficient in size to provide a wide variety of teaching-learning experiences based on the instructional program of the department. It should not be so extensive as to require an unjustifiable expenditure of time on the part of students and instructor above and beyond that time necessary for students to be exposed to and to become proficient in the different skills and abilities capable of being developed.

The area should be readily accessible to the department, properly fenced, and storage provided for tools, supplies, and equipment used exclusively on the land laboratory. Additional facilities should be constructed based on the program of instruction. For example, a good set of pens is necessary in a cattle operation.

H. Total Spatial Requirements

The combination of facility areas recommended for a particular building will depend on several factors. The various levels of instruction, kinds of students, program offerings, and number of teaching units available all must be considered in determining exact facility needs.

Two examples are considered below:

1. Single teacher department offering basic Agriculture I and II and advanced agriculture in a high school setting. (One classroom, resource area, office, clean-up area, general shop and patio, and storage areas.)

a. Basic Unit Under Roof	4,772	to	5,896 sq.ft.
b. Attached Shop Patio	2,000	to	3,000 sq.ft.
Sub-total Area	6,772	to	8,896 sq.ft.
c. Horticultural Patio (Optional)	1,200	to	3,600 sq.ft.
Total Area	7,972	to	12,496 sq.ft.

2. Multi-teacher department offering a variety of advanced occupational clusters in an area school or community college. (Two classrooms, resource area, office, clean-up area, general shop, mechanics laboratory and storage areas.)

a. Basic Unit Under Roof	7,732	to	10,076 sq.ft.
b. Attached Shop Patio	2,400	to	4,000 sq.ft.
c. Attached Horticultural Patio	1,200	to	3,600 sq.ft.
Total Area	11,332	to	17,676 sq.ft.

SERVICES AND UTILITIES

A. Electricity

1. Electricity should be available in 120 and 240 volt, single phase 60 cycle current. Three phase 240 volt current should be provided if equipment is to be installed which will require it.

2. All 120 volt duplex wall receptacles in the agricultural mechanics shop should be of three wire ground type with a minimum of 15 ampers capacity and should be installed no fathern than 10 ft. apart around the perimeter of the shop just above workbench height and near all special work areas.

3. At least four 240 volt single phase wall receptacles with a minimum

of 70 amperes capacity should be provided in the welding area of the agricultural machinery shop. One 240 volt wall outlet for a portable welder should also be provided adjacent to the rear shop door leading to the adjoining patio area and at least one of the 240 volt outlets in the patio area itself should be for the use of a welder.

4. Both 120 and 240 volt receptacles will be needed in the patio area.

5. An overhead power supply providing drop cord outlets of both 120 and 240 volts is preferable to floor outlets to permit flexibility in spacing power equipment and tools in the agricultural machinery shop.

6. Master safety switches located in several different locations within immediate reach of teachers or students should be installed in the shop circuits so that electrical power may be cut off quickly in case of an emergency.

B. Lighting

1. Diffused fluorescent lighting should be provided in the classrooms, resource centers, offices, and shop areas.

2. Lighting should be uniform and should not be a source of glare.

3. A minimum of 50 foot candles of light at working level should be provided inside the agricultural machinery shop.

4. Lighting should be provided in both the agricultural machinery patio area and in the horticultural patio area for night work.

5. Lighting should be provided in the storage structures on the land laboratory.

C. Water

1. Hose bibs will be needed in the machinery cleanup area of the agricultural machinery patio, in at least four locations in the horticultural patio area, and thorughout the land laboratory.

2. Hot and cold water should be available in the restrooms, shower area, at the gang type wash basin in the shop, and at the sink in the classroom.

3. Cold water should be provided at sinks or parts cleaning vats in the agricultural machinery shop and in the metal working area.

4. Cold water lines should be provided to the plant or vegetable washing rack and to the mist beds in the horticultural patio area.

5. Water faucets should be provided in several locations along the outside walls of the agricultural center for ease in caring for the landscaping of the site.

D. Drainage

1. The paved floor in the agricultural machinery patio should slope to a drain containing a grease trap since machinery will be cleaned in this area.

E. Ventilation

1. Adequate ventilation to move and exhaust air in the agricultural machinery shop is needed.

2. Exhaust fans should be installed in the welding area.

3. Where engines are run and tested inside the agricultural machinery shop, additional exhaust equipment is needed.

F. Heating, Cooling, and Humidity Control

1. The classroom, resources center, and office areas should be air conditioned. Air conditioning of the agricultural machinery shop is desirable.

2. Central heating is needed.

3. Air conditioning and heating equipment systems for the agricultural center should be capable of being used separately from that of the main school for those times when the main systems for the school are shut down.

4. A means of controlling the humudity level in the classroom storage area should be provided to prevent damage to stored materials.

5. Humudity controls will need to be installed in some greenhouses in some parts of the state depending upon the type of horticultural program undertaken.

G. Air

1. Air lines from the air compressor should extend around the perimeter of the agricultural machinery shop and patio with quick connecting fittings being installed every twenty feet or at the right hand side of work benches at work bench height.

2. If a separate air compressor is placed in the agricultural center, it should be located in the patio area to keep noise down in the shop area.

H. Service and Access Areas

1. A hard surfaced drive should be provided leading to the parking, patio, and shop areas for delivery service and other traffic. A minimum of backing up should be required for vehicles and equipment.

2. An overhead garage type door is needed in the agricultural machinery

shop to move equipment and materials in and out. This door should be large enough to accommodate the largest piece of field equipment contemplated being used in the program.

3. In designing entrances to the patio and shop areas for the access of large equipment, gates and doors should be laid out in a straight line to facilitate movement through both areas with a minimum loss of usable wall and floor space.

ENVIRONMENTAL FACTORS

A. Colors

1. Pastel wall colors should be selected to provide the most ideal teaching-learning environment.

2. A system of color dynamics should be applied in the shop area, including equipment, to promote safety and contribute to the learning environment.

B. Noise

1. Acoustical material should be installed on the ceiling and upper wall areas of the agricultural mechanics shop to reduce noise levels.

2. The classrooms and resource center should be noise conditioned.

C. Outside Views

1. Windows in the shop areas should be above "standing" height to prevent outside distractions and to provide unbroken expanses of wall space for flexibility in arranging the placement of tool cabinets, equipment, and work benches.

D. Orientation to the Sun

1. The facility should be designed in such a way that most effective orientation to the sun is possible, especially for the horticultural area.