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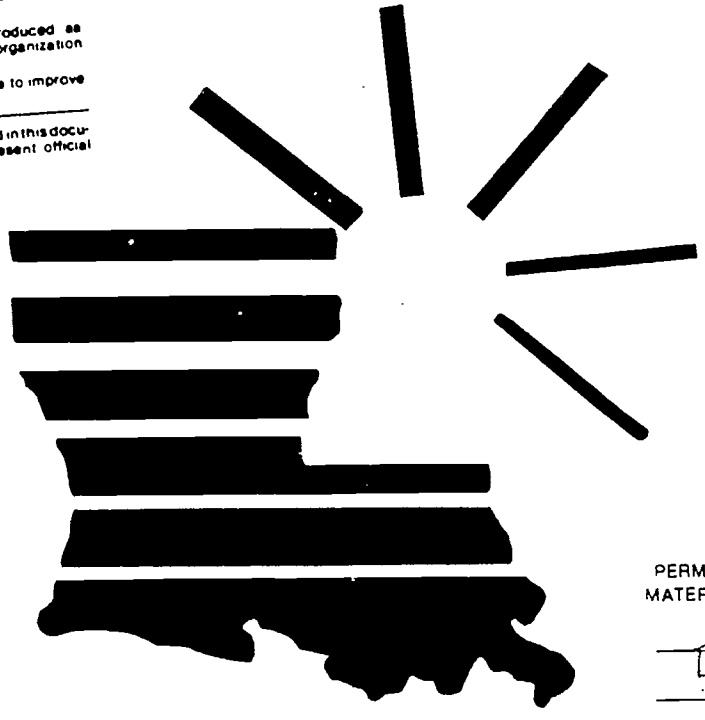
ABSTRACT

A survey of all 226 agriscience teachers in Louisiana sought to identify the areas of the revised agricultural science curriculum in which teachers needed increased knowledge and skills for teaching; 206 responses were received. A secondary purpose was to identify time schedules and types of presenters preferred by agriscience teachers for inservice programs. The two-part questionnaire asked for demographic information and information on the teacher's self-perceived levels of knowledge and skills in certain curriculum areas. Related items on the instrument were combined into nine scales. Mean scores were calculated for each scale and for each respondent. Descriptive statistics were used to describe the demographic characteristics and the mean scale scores. Teacher preferences for inservice time schedules and presenters were transformed into a mean rating score for each. Pearson's correlations were used to determine relationships between selected demographic variables and scale scores. Agriscience teachers preferred inservice programs that were presented at the summer leadership camp by qualified university personnel. Topic areas in which teachers needed inservice assistance were plant science biotechnology, applied science skills, and animal science biotechnology. No correlations were found between the teacher's mean topic areas scores and selected demographic variables. (Appendixes include 10 references, survey, and cover letters and follow-up materials.) (YLB)

Vocational Education Curriculum Development

Analysis of the Inservice Needs of Agriscience/Agribusiness Teachers for Teaching Applied Agricultural Sciences in Louisiana



1992

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ANALYSIS OF THE INSERVICE NEEDS OF AGRISCIENCE/AGRIBUSINESS TEACHERS FOR TEACHING APPLIED AGRICULTURAL SCIENCES IN LOUISIANA

1992

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Dr. Raymond G. Arveson
State Superintendent of Education

FOREWORD

This research report, Analysis of the Inservice Needs of Agriscience/Agribusiness Teachers for Teaching Applied Agricultural Sciences in Louisiana, was produced as a result of a project funded by the Louisiana State Department of Education to Louisiana State University, Baton Rouge, Louisiana. This report represents the concerted efforts of agriscience/agrimarketing teachers, teacher educators in agriculture, and state supervisory staff members in agriculture education across the state of Louisiana.

This project was conducted for the express purpose of aiding experienced and beginning agriscience/agrimarketing teachers in conducting effective agriscience/agrimarketing programs. Specifically, the project was developed to provide information for planning needed inservice programs to help agriscience teachers deliver timely and effective student centered instruction in agriscience courses. We believe that this study will make a major contribution to the improvement of agricultural education in Louisiana.

Raymond G. Arveson
State Superintendent of Education

ACKNOWLEDGEMENTS

This publication represents the cooperative efforts of personnel in the School of Vocational Education at Louisiana State University and the Office of Vocational Education, Louisiana State Department of Education. Several persons contributed to the success of this research project. The project director was Dr. AnnaBeth Neason. Special appreciation is expressed to the members of the advisory committee who helped direct the project. The advisory committee members were:

Ms. Kathy Conerly	Zachary High School
Ms. Cheryl Page	Denham Springs High School
Mr. Robert Simmons	State Department of Education, Vocational Education

These advisory committee members provided valuable input in directing and reviewing the project. Special thanks and recognition go to Dr. Joe Kotrlik for his assistance in analyzing project data and evaluating the instrument. Also thanks to Dr. Mike Burnett for his help in development of the research instrument. Thanks also to Dr. Florent Hardy who served as editor for this project. The state staff will be able to plan timely, needed inservice programs for the agriscience teachers as a result of this project. Better informed teachers will provide agriscience/agrimarketing programs that better serve the students enrolled in agricultural education in Louisiana.

Ms. Chris Strother
Assistant Superintendent
Vocational Education

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Analysis of Agriscience Teacher Inservice Needs in Louisiana

Agriculture has become one of the fastest changing industries in America. Advances in biotechnology, genetic engineering, international marketing, and other areas have broadened the scope of agriculture. Growth in the areas of aquaculture and specialized production systems, changes in plant technology, emphasis on environmental protection, and the development of advanced breeding methodologies require a knowledgeable work force that can solve problems and use critical thinking skills (National Council on Vocational Education, 1990).

As a result of the many changes in agriculture, agricultural education has also changed. In the early 1980's vocational agriculture was primarily a program designed to prepare individuals for employment in food and fiber production. By 1990, vocational agriculture had become a diversified instructional program designed to prepare students for employment in agricultural production, biotechnology, applied sciences, and other diversified areas of agriculture. Many states changed their curricula to include a new emphasis on applied science and math skills that students would need to survive in a high technology world of work. In 1989 and 1990 Louisiana spent more than $84,000 to upgrade the secondary agriculture curricula for use in agriscience programs. The revised Louisiana agricultural science curriculum includes a greater emphasis on science and math and addresses a broader spectrum of agricultural occupational areas including food science, entomology, environmental protection, biotechnology, natural resource management, and diversified agricultural production. The changes in the Basic and Advanced curricula updated the information being taught in the agricultural science programs. With new

materials, teachers can better prepare their students for challenging careers in today's world of agricultural careers.

For the new curricula to be successfully implemented, teachers must have adequate knowledge and skills to teach the revised topic areas. Osborne and Miller (1985) found that teachers who have a high level of ability in certain skill areas are more confident in their ability to demonstrate these skills. They also noted that confident teachers taught the skills more often, and used methods involving live specimens and student practice more frequently. Teachers who lack confidence in performing a skill teach about that skill area, but seldom do they actually demonstrate the skill or teach students in an actual hands on situation. Principals in Idaho (Foster & Riensenberg, 1985) rated the technical ability of the agriculture teacher as one of the top eight indicators of a strong agriculture program.

Many Louisiana agriscience teachers completed their college degrees a number of years ago. The science skills they learned such as using a microscope, preparing slides, balancing a scale, etc. may have been forgotten over time. Teachers may not feel they have an adequate knowledge base to teach some areas of the new curriculum. The new agriscience curriculum also includes competencies that involve many biotechnology skills and concepts. Few agricultural teachers have had the opportunity to develop these science and biotechnology skills. Now these teachers must teach and prepare their students in these same skill areas for employment. Kirby (1990) reported that teachers in North Carolina felt a lack of teacher knowledge was one of the major barriers in teaching agriscience and biotechnology. Other investigators (Iverson, Boreing, Robinson, and Carpentier, 1991) found

teachers had high levels of interest in various areas of biotechnology, but they perceived their knowledge of these areas to be limited. In Nebraska, Dillon (1989) found a major barrier to implementing a revised agribusiness course was a lack of knowledge on the part of the teachers.

One method for improving the teachers' knowledge base is through inservice workshops. Teachers perceived inservice workshops to be the most effective means for learning about biotechnology (Kirby, 1990). Birkenholz and Harbstreit (1987) also reported that first year teachers rated skill improvement as their top priority for assistance through teacher inservice programs. Burnett and Yahya (1987) found beginning vocational agriculture teachers in Louisiana felt a greater need for knowledge and skills in each of the major technical areas than they possessed upon graduation from college. These beginning teachers identified their lowest levels of knowledge and skills in the areas of agribusiness/farm management, use and conservation of natural resources, and high technology as applied in the agriculture industry. According to Frick (1991) agricultural educators must make a commitment to life-long learning to facilitate changes in the curriculum. He stated, "new skills and knowledge to teach cutting edge subjects are needed to implement innovative curriculum changes" (Frick, 1991, p. 19).

The next step for implementing the revised agricultural science curriculum is the development of teacher inservice programs in technical agriculture. Information is needed to identify which topic areas teachers feel they need assistance. This information will serve as a basis for planning inservice programs. This study was

developed to determine the level of teacher knowledge and skills in each of the topic areas in the revised basic and advanced agricultural curricula.

Purposes and Objectives

This study was designed to identify the areas of the revised Louisiana agricultural science curriculum in which teachers need increased knowledge and skills for teaching. A secondary purpose was to identify time schedules and types of presenters preferred by agriscience teachers for inservice programs in Louisiana. The specific objectives were:

1. To describe selected demographic characteristics of agriscience teachers in Louisiana.
2. To determine agriscience teachers' preferences in selection of time schedules and types of presenters for future inservice programs.
3. To identify agriscience teachers' self-perceived knowledge and skill levels for selected topic areas in the revised agricultural science curriculum.
4. To determine topic areas in the revised agricultural science curriculum for which agriscience teachers need inservice assistance.
5. To determine if relationships exist between the agriscience teachers' perceived level of knowledge and skills and selected demographic variables.

Procedures

Population

The population for this study was the 226 agriscience teachers in Louisiana. All 226 teachers were surveyed for this study.

Methodology

An advisory committee was formed to guide in the administration of the project. The advisory committee met to review the objectives of the project and to offer suggestions for successful completion of the study. The advisory committee consisted of Robert Simmons, a representative from the Office of Vocational Education; Cheryl Page, a secondary science teacher; and Kathy Conerly, an agricultural science teacher. The committee reviewed the project and assisted in the development of the instrumentation for the project.

Instrumentation

The questionnaire had two parts. The first part asked for demographic information about the teacher. Selected demographic variables were identified in the literature review that were related to teacher ability. Teachers were also asked to indicate their preferences for time schedules and types of presenters used in inservice programs.

The second part of the instrument was used to obtain information on the teacher's self-perceived levels of knowledge and skills in certain areas of the revised agricultural science curriculum. This part was developed by examining the Basic Program of Agricultural Science in Louisiana (Ag I & Ag II) and the Advanced Program of Agricultural Science in Louisiana (Ag III & Ag IV) to identify those areas that were new to the curriculum or that had been revised to emphasize the math and science content. Eight topic areas and the specific revised lesson titles in each topic area were included in the instrument. Applied science skills that were needed to teach the revised materials were also listed in the instrument. Agriculture teachers

were asked to rate their own level of knowledge and skills for each of the lesson topics and skills using a four point scale.

The content validity of the instrument was assessed by the advisory committee and two agricultural teacher educators. The committee verified the content validity of the instrument. The internal consistency of the topic scales was measured by Cronbach's alpha. All topic scales had an alpha level of 0.87 or better. This level was acceptable for the study.

Data Collection

The instrument and a cover letter were mailed to each agriscience teacher in Louisiana. A postcard reminder was mailed one week later. A second mailing of the instrument was sent to nonrespondents two weeks after the initial mailing. The second mailing was followed by a postcard mailed one week later. A total of 178 teachers responded to the mailings. Four weeks after the initial mailing, thirty of the nonrespondents were contacted by phone. Twenty-eight instruments were returned by the individuals contacted by phone. Two additional unsuccessful attempts were made to contact the two nonrespondents. A comparison of the mail versus phone respondents on the nine topic scale scores revealed no significant differences between the two groups. The data were combined for analysis.

Data Analysis

To simplify the data analysis, all items were examined for common subject matter content. Related items were combined into nine scales based upon this initial examination. A confirmatory factor analysis was run on the nine scales. Each item

had a factor loading of 0.5 or greater for the selected scale. This shows there was a common underlying dimension or factor for each scale.

Mean scores were calculated for each of the nine scales for each respondent. Descriptive statistics including frequencies, percents, and means were used to describe the demographic characteristics of the population and the mean scale scores. Teacher preferences for inservice time schedules and presenters were transformed into a mean rating score for each item. A first choice ranking was given a weight of 3. A second choice ranking was given a weight of 2. A third choice ranking was given a weight of 1. The total ranking score was then divided by the number of respondents (n = 206). Pearson's correlations were used to determine relationships between selected demographic variables and scale scores. For those items that were nominal variables, the point biserial coefficient was approximated by the Pearson's correlation coefficient. Correlations were interpreted using the set of descriptors proposed by Hinkle, Wiersma, and Jurs (1979).

Results

Objective 1 - Demographic Characteristics of the Agriscience Teachers in Louisiana

The agriscience teachers had taught secondary agriculture for an average of 14.22 years. The population included three first year teachers and three teachers with thirty or more years of experience each. Nearly half (49.2%) of the teachers had taught secondary agriculture for eleven to twenty years. There are 21.5% of the teachers that have more than twenty years of teaching experience. The teachers received their B.S. degrees an average of 16.5 years before the study. A total of

174 (84.5%) teachers were members of the Louisiana Vocational Agriculture Teachers Association (LVATA).

There were 77 (37.4%) teachers who taught one or more science courses other than agricultural science. A total of 24 teachers reported they taught the eighth grade earth science course; 20 teachers taught physical science; and 18 teachers taught environmental science. Other science courses taught by the agriscience teachers were 7th grade life science (N = 10), general science (N = 10), biology (N = 13), and chemistry (N = 5).

Agriscience teachers taught an average of 4.9 agricultural science classes per semester. More than one-third of the teachers (35%) taught six agriculture classes per semester. Another 29% (59) of the teachers taught 5 agriscience classes. An average of 83 students were enrolled in the agriculture courses taught by each teacher. Teachers were requested to report any students who were enrolled in more than one agriculture course only once. The highest number of students reported enrolled by one teacher was 188 students. The lowest number of students was 22 students. More than 31% of the teachers reported they had 100 or more students enrolled in their agriscience classes.

Only three teachers (1.5%) reported teaching a sixth grade agricultural course; 31 teachers (15.0%) reported that they taught a seventh grade course. Eighth grade agriculture courses were taught by 45 teachers (21.8%). Agriscience I, II, II, and IV are the most commonly taught courses. A total of 184 teachers (89.3%) taught Agriscience I, 170 teachers (82.5%) taught Agriscience II, 156 teachers (75.7%) taught Agriscience III, and 148 teachers (71.8%) taught Agriscience IV. There were

88 teachers (42.7%) reporting they taught an Agricultural Lab class, and 45 teachers (21.8%) reported having a Cooperative Agricultural Education class.

Objective 2 - Agriscience Teachers' Inservice Preferences

The agriscience teachers were asked to select their time preferences for scheduling inservice programs (Table 1). The overwhelming choice for inservice programs with a mean rating of 2.06 is during the summer leadership camp. This option received 102 first choices and 51 second choices from the teachers. The camp lasts four days and teachers are involved in inservice programs while their students attend leadership development sessions conducted by the state FFA officers. The second highest choice ($\underline{M}$ = 1.35) is for day meetings during the week in the summer. This option received 30 first choices and 76 second choice ratings. The third highest time preference is for weekday meetings during the school year with a mean rating of 0.87. This selection was rated first by 20 teachers and rated second by 45 teachers.

The teachers were asked to select the types of individuals they prefer as presenters for the inservice meetings (Table 2). University faculty members received the highest ratings with a mean rating of 1.52. The university faculty received 63 first choices and 44 second choices. Agricultural industry representatives were the second choice with a mean rating of 1.3. This option received 46 first choices and 49 second choices. Other agriscience teachers were the third choice for presenters with a mean rating of 1.08. Forty-one teachers selected other agriscience teachers as their first choice and 34 teachers selected this item as their second choice. Many

teachers noted on the instrument that it did not matter who presented the programs as long as they were knowledgeable about the subject area.

Table 1

Teacher Preference for Scheduling of Inservice Programs (N = 206)

Times	Rating Total	Mean Rating	Rank
Summer leadership camp	425	2.06	1
Weekday meeting during the summer	279	1.35	2
Weekday meeting during the school year	180	0.87	3
Night meeting during the summer	83	0.40	4
Night meeting during the school year	52	0.25	5
Saturday meeting during the summer	51	0.25	6
Saturday meeting during the school year	35	0.17	7
Other times	8	0.04	8

Table 2

Teacher Preference for Inservice Program Presenters (N = 206)

Inservice Presenter	Rating Total	Mean Rating	Rank
University faculty members	312	1.52	1
Agricultural industry representatives	267	1.30	2
Other agriscience teachers	222	1.08	3
State or area extension personnel	175	0.85	4
Agricultural agency representative (USDA, SCS, etc.)	161	0.78	5
Other types of presenters	9	0.04	6

Objective 3 - Agriscience Teachers' Self-perceived Levels of Knowledge and Skills

Scores for each of the nine topic scales were calculated as indicators of the teacher's self-perceived level of knowledge and skill in each topic area. The overall grand means for the topic scales are presented in Table 3. The mean topic scale scores are presented in descending order. Midpoints were used as the break points between each level of the scale.

There were six topic scales with mean scores above a 2.5 which indicated the teachers perceived they had sufficient knowledge or skills in those areas. Soil science received the highest mean with a score of 3.11 on the four point scale. More than 25% of the teachers (N = 55) perceived they had strong knowledge and

skills in the soil science area. An additional 60% (N = 121) of the teachers responded that they had sufficient knowledge and skills for the soil science scale. Plant and soil fertility was the second highest topic scale with a grand mean of 3.03. Nearly 20% (N = 42) of the teachers indicated they had strong knowledge or skills in plant and soil fertility. More than 65% (N = 134) indicated they had sufficient knowledge and skills in this area.

Four other topic scale means were between 2.5 and 3.0. They were basic animal science (M = 2.84), basic plant science (M = 2.78), pest management (M = 2.61) and natural resource management (M = 2.52). The remaining three scales had means between 2.0 and 2.5.

The soil science scale included eight items (Table 4). These items addressed the areas of formation, composition, properties and conservation of soil and soil water. Every item had a mean of 2.5 or better. Most of the teachers (59% or more) indicated they had sufficient or strong knowledge and skills for each item in the scale. The item "definition of soil" had the highest mean (M = 3.35). The item "soil water" had the lowest mean (M = 2.72). The teachers indicated they had at least some knowledge for each item in the scale except the items "soil water" and "soil erosion and conservation." Better than one-third of the teachers indicated they had only some or no knowledge and skills for the item "soil water."

The plant and soil fertility topic scale consisted of seven items (Table 5). The items in this scale related to the areas of plant nutrition, soil fertility and pH, fertilizers and the use of fertilizers. Each mean item score was greater than 3.00 except the item "calibrating fertilizer applications" which had a mean of 2.54. The

highest mean was for the item "soil acidity and alkalinity" with a 3.15. More than 78% of the teachers indicated they had sufficient or strong knowledge and skills for each of the items except the item "calibrating fertilizer applications." Less than 50% of the teachers indicated they had sufficient or strong knowledge or skills for "calibrating fertilizer applications." The mean score for the knowledge item "application of fertilizers" was 3.12. However, the mean score for "calibrating fertilizer applications" was a 2.54. The item "application of fertilizers" deals with general knowledge related to using fertilizers. "Calibrating fertilizer applications" relates to skills used for properly setting fertilizer equipment to obtain the correct rate of application.

Table 3

Means of Teachers' Self-perceived Levels of Knowledge and Skills by Topic Areas in Agricultural Science (N = 206)

Topic area	Number of Lesson Topics	M	S.D.	Cronbach's α
Soil science	8	3.11	.55	.95
Plant & soil fertility	7	3.03	.53	.89
Basic animal science	7	2.84	.58	.89
Basic plant science	9	2.78	.48	.87
Pest management	11	2.61	.56	.92
Natural resource management	5	2.52	.63	.88
Animal science biotechnology	12	2.39	.55	.90
Applied science skills	7	2.24	.64	.90
Plant science biotechnology	10	2.10	.57	.91

Note: 1 = I do not have the knowledge and skills, 2 = I have some knowledge and skills, 3 = I have sufficient knowledge and skills, 4 = I have strong knowledge and skills. Midpoint ranges were used for interpretations.

Table 4

Distribution of Scores for Items in the Soil Science Scale (N=206)*

Items	1		2		3		4		Grand
	N	%	N	%	N	%	N	%	Mean
Soil science	0	0.0	3	14.7	121	58.8	55	26.8	3.10
Definition of soil	0	0.0	11	5.3	111	53.9	82	39.8	3.35
Composition of soil	0	0.0	16	7.8	112	54.4	76	36.9	3.30
Soil formation	0	0.0	22	10.7	109	52.9	73	35.4	3.25
Physical properties	0	0.0	23	11.2	108	52.4	71	34.5	3.23
Soil erosion & conservation	2	1.0	35	17.0	111	53.9	54	26.2	3.07
Biological properties	0	0.0	47	22.8	104	50.5	52	25.2	3.03
Chemical properties	0	0.0	57	27.7	104	50.5	42	20.4	2.93
Soil water	4	1.9	77	37.4	93	45.1	29	14.1	2.72

* Missing values are not included.

Note: 1=I do not have the knowledge and skills, 2=I have some knowledge and skills, 3=I have sufficient knowledge and skills, 4=I have strong knowledge and skills. Midpoints were used to determine ranges.

Table 5

Distribution of Scores for Items in the Plant Fertility Scale (N = 206)*

	1		2		3		4		Grand
Items	N	%	N	%	N	%	N	%	Mean
Plant & soil fertility	1	.5	29	14.1	134	65.0	42	20.4	3.03
Soil acidity & alkalinity	1	0.5	26	12.6	118	57.3	58	28.2	3.15
Fertilizers and plants	0	0.0	26	12.6	124	60.2	55	26.7	3.14
Nutrient requirements of plants	0	0.0	31	15.0	115	55.8	57	27.7	3.13
Correcting soil acidity	1	0.5	32	15.5	112	54.4	58	28.2	3.12
Application of fertilizers	2	1.0	31	15.0	111	53.9	59	28.6	3.12
Organic and inorganic fertilizers	2	1.0	40	19.4	113	54.9	48	23.3	3.02
Calibrating fertilizer applications	20	9.7	80	38.8	69	33.5	29	14.1	2.54

* Missing values are not included.

Note: 1 = I do not have the knowledge and skills, 2 = I have some knowledge and skills, 3 = I have sufficient knowledge and skills, 4 = I have strong knowledge and skills. Midpoints were used to determine ranges.

There were seven items in the basic animal science scale (Table 6). The items in this scale related to the areas of anatomy and physiology, nutrition and feeding, diseases, and parasites of livestock and poultry. The item "anatomy and physiology of livestock" had the highest mean with a score of 3.11. Nearly 84% (N = 172) of the teachers indicated they had sufficient or strong knowledge and skills in this area. More than 55% of the teachers perceived they had sufficient or strong knowledge and skills for each item listed. The lowest mean was a 2.63 for the scale item "ration formulation." More than a third of the teachers indicated they had only some or no knowledge and skills in the areas of "ration formulation," "livestock and poultry diseases," and "livestock and poultry parasites."

The basic plant science scale included nine items (Table 7) that were related to basic plant growth, production, and reproduction. The highest item with a mean of 3.21 was "structure of plants." More than 50% of the teachers indicated they had sufficient or strong knowledge and skills for the items "structure of plants," "physiology of plants," "environmental factors affecting plant growth," "moisture control," "plant classification," "propagation," and "propagation techniques." The lowest item mean was for "applied genetics" with a mean of 2.32. This was the only item with a mean below 2.5, indicating that the teachers perceived they had only some knowledge or skills in the areas of applied genetics for plant science. The second lowest item mean in this scale was "seed plant improvement" with a mean of 2.50. More than 50% of the teachers indicated they had only some or no knowledge and skills for these two items.

The pest management scale contained eleven items (Table 8). The items were related to the areas of identification and control of insects, diseases, and weeds. This scale also addresses the use of pesticides and the alternatives to chemical pesticides for control of pests. All individual item means were above a 2.5 except on two items. The items with means below 2.5 were "principles of IPM" (M = 2.15) and "termites" (M = 2.13). More than 70% of the teachers indicated they had only some or no knowledge or skills for these two items. Both "weed control" and "safe use of agricultural chemicals" had means of 2.86. These were the two highest means in the scale. More than 50% of the teachers rated their skills as sufficient or strong for the items "weed control," "control of insects," "advantages and disadvantages of pesticides," "safe use of agricultural chemicals," "pesticide application methods," and "mixing and applying pesticides."

There were five items in the natural resource management scale (Table 9). The items "wildlife conservation" and "environmental protection" each had a mean of 2.68. These were the highest item means in the scale. More than 50% of the teachers indicated their skills were sufficient or strong for both items and for the item "wildlife production requirements." The lowest mean was a 2.31 for the item "habitat analysis and evaluation." More than 50% of the teachers indicated they had only some or no knowledge or skills for the items of "habitat analysis and evaluation" and "ecosystems and populations."

Table 6

Distribution of Scores for Items in the Basic Animal Science Scale (N = 206)*

Items	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	Grand Mean
Basic animal science	3	1.5	58	28.3	114	55.5	31	14.0	2.84
Anatomy and physiology of livestock	0	0.0	32	15.5	117	56.8	55	26.7	3.11
The digestive process	4	1.9	46	22.3	105	51.0	49	23.8	2.98
Sources of nutrients	5	2.4	52	25.2	110	53.4	37	18.0	2.88
Classification and functions of nutrients	3	1.5	58	28.2	106	51.5	36	17.5	2.86
Livestock & poultry parasites	8	3.9	74	35.9	89	43.2	33	16.0	2.72
Livestock & poultry diseases	8	3.9	74	35.9	98	47.6	24	11.7	2.68
Ration formulation	13	6.3	75	36.4	89	43.2	26	12.6	2.63

* Missing values are not included.

Note: 1 = I do not have the knowledge and skills, 2 = I have some knowledge and skills, 3 = I have sufficient knowledge and skills, 4 = I have strong knowledge and skills. Midpoints were used to determine ranges.

Table 7

Distribution of Scores for Items in the Basic Plant Science Scale (N = 206)*

Items	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	Grand Mean
Basic plant science	0	0.0	57	27.8	130	63.0	19	9.2	2.78
Structure of plants	0	0.0	20	9.7	123	59.7	63	30.6	3.21
Environmental factors affecting plant growth	3	1.5	41	19.9	116	56.3	46	22.3	3.00
Physiology of plants	2	1.0	45	21.8	117	56.8	41	19.9	2.96
Propagation	5	2.4	55	26.7	101	49.0	45	21.8	2.90
Moisture control	2	1.0	55	26.7	117	56.8	30	14.6	2.86
Propagation techniques	6	2.9	77	37.4	87	42.2	29	14.1	2.70
Plant classification	7	3.4	89	43.2	86	41.7	22	10.7	2.60
Seed plant improvement	13	6.3	93	45.1	85	41.3	15	7.3	2.50
Applied genetics	22	10.7	107	51.9	65	31.6	11	5.3	2.32

* Missing values are not included.

Note: 1 = I do not have the knowledge and skills, 2 = I have some knowledge and skills, 3 = I have sufficient knowledge and skills, 4 = I have strong knowledge and skills. Midpoints were used to determine ranges.

Table 8

Distribution of Scores for Items in the Pest Management Scale (N = 206)*

	1		2		3		4		Grand
Items	N	%	N	%	N	%	N	%	Mean
Pest management	3	1.5	90	43.9	96	46.5	17	8.4	2.61
Weed control	5	2.4	60	29.1	99	48.1	42	20.4	2.86
Safe use of agricultural chemicals	6	2.9	52	25.2	110	53.4	35	17.0	2.86
Pesticide application	5	2.4	62	30.1	97	47.1	38	18.4	2.83
Mixing & applying pesticides	7	3.4	62	30.1	95	46.1	34	16.5	2.79
Control of insects	6	2.9	63	30.6	106	51.5	30	14.6	2.78
Advantages & disadvantages of pesticides	6	2.9	68	33.0	104	50.5	25	12.1	2.73
Plant diseases	9	4.4	97	47.1	78	37.9	22	10.7	2.55
Insects & their life cycles	10	4.9	99	48.1	72	35.0	24	11.7	2.54
Control of plant diseases	8	3.9	105	51.0	71	34.5	21	10.2	2.51
Principles of IPM	42	20.4	103	50.0	40	19.4	16	7.8	2.15
Termites	42	20.4	106	51.5	45	21.8	12	5.8	2.13

* Missing values are not included.

Note: 1 = I do not have the knowledge and skills, 2 = I have some knowledge and skills, 3 = I have sufficient knowledge and skills, 4 = I have strong knowledge and skills. Midpoints were used to determine ranges.

Table 9

Distribution of Scores for Items in the Natural Resource Management Scale (N=206)*

Items	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	Grand Mean
Natural resource management	10	4.8	94	45.6	86	41.8	16	7.8	2.52
Wildlife conservation	10	4.9	75	36.4	86	41.7	31	15.0	2.68
Environmental protection	4	1.9	80	38.8	96	46.6	23	11.2	2.68
Wildlife production requirements	14	6.8	86	41.7	82	39.8	21	10.2	2.54
Ecosystems and populations	15	7.3	106	51.5	68	33.0	14	6.8	2.40
Habitat analysis and evaluation	30	14.6	92	44.7	69	33.5	12	5.8	2.31

* Missing values are not included.

Note: 1=I do not have the knowledge and skills, 2=I have some knowledge and skills, 3=I have sufficient knowledge and skills, 4=I have strong knowledge and skills. Midpoints were used to determine ranges.

Objective 4 - Topic Areas in Which Agriscience Teachers Need Inservice Assistance

A mean scale score below 2.5 was considered an indicator of a need for teacher inservice assistance (see Table 3). Increased knowledge or skills would improve the teacher's ability to teach that topic area. The lowest mean (2.10) was in the area of plant science biotechnology. Only 19.1% (N = 39) of the teachers indicated they had sufficient or strong knowledge skills in this area. Applied science skills (M = 2.24) and animal science biotechnology (M = 2.39) were the other topic scales with means below a 2.5. Many teachers (61.8%) indicated they had some knowledge or skills in the area of animal science biotechnology. However, only 34% of the teachers (N = 69) indicated they had sufficient or strong knowledge or skills in that area. For the applied science skills, 32% (N = 65) of the teachers indicated they had sufficient or strong knowledge or skills.

The plant science biotechnology scale contained ten items (Table 10). The item "organic production" (M = 2.71) was the only item that teachers indicated they had sufficient knowledge or skills. All other item means were below a 2.5. "Tissue culture techniques" had the lowest mean with a 1.77. "Culturing bacteria and fungi for disease identification" was the second lowest item with a mean of 1.80. Less than one-third of the teachers indicated they had sufficient or strong skills for the items "tissue culturing and plant breeding," "genetic engineering and plant breeding," "soilless plant culture," "plant breeding," "tissue culture techniques," "culturing bacteria and fungi for disease identification," and "hydroponics techniques." A majority (50% or more) of the teachers denoted they had only some or no knowledge or skills for each of the items in this scale.

Table 10

Distribution of Scores for Items in the Plant Science Biotechnology Scale (N=206)*

Items	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	Grand Mean
Plant science biotechnology	35	17.0	130	63.2	37	18.2	2	1.0	2.10
Organic production	9	4.4	64	31.1	100	48.5	25	12.1	2.71
Irrigation systems	22	10.7	98	47.6	63	30.6	20	9.7	2.40
Plant production systems	26	12.6	101	49.0	64	31.1	10	4.9	2.29
Plant breeding techniques	28	13.6	101	49.0	60	29.1	9	4.4	2.25
Soilless plant culture (hydroponics)	51	24.8	109	52.9	35	17.0	8	3.9	2.00
Hydroponics techniques	51	24.8	105	51.0	34	16.5	6	2.9	1.97
Tissue culture & plant breeding	58	28.6	104	50.5	35	17.0	6	2.9	1.95
Genetic engineering	67	32.5	103	50.0	29	14.1	3	1.5	1.84
Culturing bacteria & fungi	75	36.4	91	44.2	24	11.7	6	2.9	1.80
Tissue culture techniques	74	35.9	98	47.6	23	11.2	3	1.5	1.77

* Missing values are not included.

Note: 1=I do not have the knowledge and skills, 2=I have some knowledge and skills, 3=I have sufficient knowledge and skills, 4=I have strong knowledge and skills. Midpoints were used to determine ranges.

There were seven items included in the applied science skills scale. These items included science skills such as use of microscopes, preparation of slides, selection and care of specimens, and conducting science experiments that are used in several areas of the curriculum. The item "conducting basic science experiments" had the highest mean with a 2.67. The items, "drying and mounting plants" and "collecting and mounting insects" received mean scores of 2.5 or better. There were 50% or more of the teachers who indicated they had sufficient or strong skills in "collecting and mounting insects" and in "conducting basic science experiments." The items dealing with using microscopes, selecting specimens, and making slides had means between 1.5 and 2.5 indicating the teachers had only some knowledge in these areas. The item "selecting specimens for dissecting microscopes" had the lowest mean with a 1.86.

Twelve items were included in the scale for animal science biotechnology (Table 12). The item "reproductive processes of mammals and poultry" was the highest rated item with a mean of 3.15. Three other items, "anatomy and physiology of reproduction," "breeding methodology," and "administering vaccines and medications," also had means above a 2.5. More than 60% of the teachers indicated they had sufficient or strong skills in these areas. The item with the lowest mean ($\underline{M}$ = 1.80) was "handling animal specimens." Less than one-third of the teachers indicated sufficient or strong skills in the areas of "antimicrobial therapy and vaccinations," "embryo transfer techniques," "handling tissue specimens," "taking blood samples," "using implants," and "determining parasite infestations."

Table 11

Distribution of Scores for Items in the Applied Science Skill Scale (N=206)*

Items	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	Grand Mean
Applied science skills	27	13.1	114	55.5	50	24.3	15	7.4	2.24
Conducting basic science experiments	12	5.8	68	33.0	91	44.2	27	13.1	2.67
Drying & mounting plants	20	9.7	81	39.3	65	31.6	32	15.5	2.55
Collecting & mounting insects	23	11.2	71	34.5	76	36.9	27	13.1	2.54
Using a dissecting microscope	44	21.4	96	46.6	47	22.8	11	5.3	2.13
Using a monocular microscope	50	24.3	101	49.0	39	18.9	8	3.9	2.03
Taking tissue specimens & making slides	63	30.6	100	48.5	27	13.1	8	3.9	1.90
Selecting specimens for dissecting microscopes	69	33.5	95	46.1	28	13.6	6	2.9	1.86

* Missing values are not included.

Note: 1=I do not have the knowledge and skills, 2=I have some knowledge and skills, 3=I have sufficient knowledge and skills, 4=I have strong knowledge and skills. Midpoints were used to determine ranges.

Table 12

Distribution of Scores for Items in the Animal Science Biotechnology Scale (N = 206)

Items	1		2		3		4		Grand
	N	%	N	%	N	%	N	%	Mean
Animal science biotechnology	9	4.5	127	61.8	63	30.7	6	3.0	2.39
Reproductive processes of mammals & poultry	2	1.0	28	13.6	111	53.9	63	30.6	3.15
Anatomy & physiology of reproduction	2	1.0	47	22.8	103	50.0	52	25.2	3.01
Breeding methodology	4	1.9	59	28.6	98	47.6	43	20.9	2.88
Administering medications	11	5.3	60	29.1	89	43.2	38	18.4	2.78
Artificial insemination techniques	32	15.5	71	34.5	68	33.0	27	13.1	2.46
Resistance to diseases & the immune system	21	10.2	101	49.0	72	35.0	9	4.4	2.34
Using implants	53	25.7	78	37.9	45	21.8	22	10.7	2.18
Antimicrobial therapy & vaccinations	36	17.5	108	52.4	52	25.2	7	3.4	2.15
Taking blood samples	43	20.9	107	51.9	39	18.9	9	4.4	2.07

(table continues)

Items	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	Grand Mean
Embryo transfer techniques	67	32.5	86	41.7	42	20.4	3	1.5	1.90
Determining parasite infestations	74	35.9	88	42.7	28	13.6	7	3.4	1.84
Handling animal specimens	78	37.9	86	41.7	28	13.6	5	2.4	1.80

Missing values are not included.

Note: 1 = I do not have the knowledge and skills, 2 = I have some knowledge and skills, 3 = I have sufficient knowledge and skills, 4 = I have strong knowledge and skills. Midpoints were used to determine ranges.

Objective 5 - Relationships Between Agriscience Teachers' Scale Scores and Selected Demographic Characteristics

Selected teacher characteristics were compared with teacher's mean topic scores to determine if relationships existed among these variables. The demographic characteristics used were years since receiving B.S. degree, years of secondary agriculture teaching experience, membership in LVATA, teaching other science courses, number of agriculture courses and students taught. None of the correlation coefficients were greater than 0.20 (Table 13). According to the preselected descriptors (Hinkle, Wiersma, and Jurs, 1979), correlation coefficients below 0.30 indicate very little, if any correlation. It was determined there were no relationships between teacher demographic characteristics and their topic scale scores.

Table 13

Correlations Between Selected Teacher Demographic Variables and Their Topic Scale Scores (N = 206)*

	Demographic variables					
Topic scale scores	Years since receiving B.S. degree	Years taught secondary agriculture	Member of LVATA	Teaches other science courses	Number of agriculture classes taught	Number of students taught in agriculture
Soil Science	-.0081	-.0134	.0064	.0354	.0411	.0584
Plant & soil fertility	.0642	.0421	.0328	.0841	.0378	.0032
Basic animal science	.0690	.0309	.1810	-.0754	.0495	-.0587
Basic plant science	-.0466	-.0379	.0333	-.0313	-.1121	-.0969
Pest management	-.0087	-.0724	.1365	-.0287	.0180	-.0511
Natural resource management	-.1063	-.1207	.0715	-.0255	.0082	-.0446
Animal science biotechnology	.0044	-.0298	.1496	-.0309	.1013	-.0604
Applied science skills	-.0660	-.1581	.0766	-.0268	.0659	-.0258
Plant science biotechnology	-.0293	-.0678	.0464	.0118	-.0467	-.0079

* Missing values are not included.

Conclusions and Recommendations

Objective 1 - Demographic Characteristics of the Agriscience Teachers in Louisiana

1. The population of agriscience teachers in Louisiana is ageing. With nearly 22% of the teachers already having completed twenty years of teaching experience, Louisiana may begin to experience an increase in retirements in the next ten years. Further studies may determine if increased efforts are needed to recruit more students into agricultural teacher education programs to fill these expected vacancies in Louisiana agriscience programs.

2. Most of the agriscience teachers are members of the Louisiana Vocational Agriculture Teachers Association. However, 15.5% of the agriscience teachers are not members. Additional studies may be needed to determine if barriers to membership exist for this portion of the population that need to be removed.

3. Many agriscience teachers are responsible for teaching one or more science courses in addition to agricultural science courses. While it is not an objective of this study, inservice work may strengthen agriscience teachers' science skills and benefit students in classes other than agriculture.

4. There is a wide range of student enrollment in the agriculture courses. This finding is supported by a reported range of 22 students to 188 students per teacher. There may be certain factors that encourage more students to enroll in the agriscience courses. Identification of these factors would help agriscience teachers across the state. Also, it would be helpful to identify the optimum or maximum number of students that one teacher may effectively teach in their agriscience courses.

5. Numerous teachers are now offering junior high and middle school agriculture courses. There were 79 teachers identified in this study that teach this level of

agriscience courses. These teachers may need additional training for effectively working with the younger students. This statistic also points out the need for an established junior high agriscience curriculum for the state.

6. Most of the teachers reported they were teaching the Agriscience I through Agriscience IV courses.

7. There are only a few Agricultural Lab courses being taught. Only 88 teachers reported they were teaching the Agricultural Lab course. Information is needed to determine why so few Agricultural Lab courses are being taught. Additional information on the subjects being taught in these courses is needed.

8. There are very few schools offering Cooperative Agriculture Education courses. Further studies may be needed to determine if there is a continuing need for the Cooperative Agriculture Education program or if efforts are needed to strengthen this program.

Objective 2 - Agriscience Teachers' Inservice Preferences

1. Agriscience teachers prefer inservice programs that are presented at the summer leadership camp or on weekdays during the summer. Weekday programs during the school year are the teachers' third time preference. Agriscience teachers do not want inservice programs presented on Saturdays during the school year.

2. Inservice programs should be presented by university faculty members, agricultural industry representatives, or other agriscience teachers. Efforts should be made to secure the services of knowledgeable and qualified university faculty members to present inservice programs at the summer leadership camp.

Objective 3 - Agriscience Teachers' Self-perceived Levels of Knowledge and Skills

1. Agriscience teachers feel they have sufficient knowledge and skills for teaching basic soil science and soil and plant fertility. They also rate their levels of knowledge and skills for basic plant science and basic animal science, pest management, and natural resource management as sufficient.

2. Agriscience teachers felt they had sufficient or strong knowledge and skills for each item in the soil science scale. However, many teachers (more than one-third) indicated they had only some or no knowledge and skills in the area of soil water. This item should be considered a secondary priority for future inservice programs.

3. Agriscience teachers have sufficient knowledge and skills in the area of plant and soil fertility ($\underline{M}$ = 3.03). The only item in this scale that might be considered for future inservice programs was the item "calibrating fertilizer application" since the item mean score was fairly low.

4. Basic animal science is another area that teachers perceive they have sufficient knowledge and skills for teaching. All item means in this scale were closely grouped. None of the topics in this scale should be considered for inservice programs in the near future.

5. Agriscience teachers have sufficient knowledge and skills for teaching basic plant science. Each item, except "applied genetics," had relatively high means. Since the item "applied genetics" had a mean of 2.32, it should be included in future inservice programs.

6. Agriscience teachers perceive they have sufficient knowledge and skills in the area of pest management. However, the items "principles of IPM" and "termites"

had means of less than 2.5. These items need to be included in inservice programs in the future.

5. The agriscience teachers just barely considered their knowledge and skills in the area of natural resource management scale as sufficient (M = 2.52). There were two items, "ecosystems and populations" and "habitat analysis and evaluation," that had means below 2.5. These items should be included in future inservice programs. Due to the low score on this scale, the whole area of natural resource management might need to be considered a secondary priority for inservice assistance.

Objective 4 - Topic Areas in Which Agriscience Teachers Need Inservice Assistance

1. Topic areas for inservice assistance for agriscience teachers should include plant science biotechnology, applied science skills, and animal science biotechnology. These are the areas the teachers rated their knowledge and skill levels below average. The state department needs to conduct a series of inservice programs in these areas. Plant science biotechnology should receive the highest priority for inservice programs.

2. The agriscience teachers had a low level of knowledge and skills in the area of plant science biotechnology. This scale had the lowest grand mean. The items related to tissue culturing, hydroponics, and genetic engineering were the lowest rated items. The whole area of plant science biotechnology should receive a top priority for teacher inservice programs. The areas of tissue culturing, hydroponics, and genetic engineering should receive special emphasis in these programs.

3. Teachers need inservice assistance in the area of applied science skills. This inservice program should emphasize the use of both dissecting and monocular microscopes and the selection and care of specimens for both types of scopes.

4. An inservice program is needed in the area of animal science biotechnology. This program should address the areas of embryo transfer, handling animal specimens, and taking blood samples as well as other areas included in this topic scale.

Objective 5 - Relationships Between Agriscience Teachers' Scale Scores and Selected Demographic Characteristics

1. There are no correlations between the teacher's mean topic area scores and selected demographic variables.

2. There was not a relationship between the number of years since the teachers received their B.S. degrees and their perceived levels of knowledge and skills. Further investigation is recommended to determine if teacher education programs need to be updated to ensure that recently graduated teachers receive a high quality education and preparation for teaching.

3. The length of time a teacher has taught has no relationship with the teacher's perceived level of knowledge and skills. New teachers perceived their levels of knowledge and skills in the same way that experienced teachers did. This may indicate that teachers need more inservice programs to improve their levels of knowledge and skills in these teaching areas.

4. Participation in the Louisiana Vocational Agriculture Teachers Association did not have any relationship with the teachers' levels of knowledge and skills. Meetings

of the LVATA may need to include more specific areas of inservice programming in the future.

5. Agriscience teachers who also taught science courses view their levels of knowledge and skills the same as teachers who did not teach science. Additional responsibility for science education has not improved the teachers' level of knowledge and skills.

6. The number of agriculture classes taught and the number of students enrolled did not have a relationship with the teacher's perceived level of knowledge and skills.

Summary

Agriscience teacher inservice programs are needed to enable teachers to be effective teachers in their agriscience programs. This study has determined that the inservice programs should be presented during the summer inservice and leadership camp held annually at the Louisiana Youth Camp in Bunkie. These inservice programs need to be presented by qualified university personnel whenever possible. The initial programs must deal with the area of plant science biotechnology. Other programs that must be planned in the near future would address the areas of applied science skills and animal science biotechnology. Additional inservice programs could include information on the specific areas identified as weak items in the other topic scales. This study should be considered before planning these programs.

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Appendix A

Instrumentation

INSERVICE NEEDS SURVEY

9~

*The new agriscience curriculum has an increased emphasis on the science of agriculture Some teachers may require additional information and training in certain areas to effectively teach the new curriculum This survey will provide the information for **designing inservice programs** tailored to meet the agriscience teachers' needs Please complete the survey and return it by **December 10, 1991.***

1. Total number of years you have taught secondary agriculture: _____
2. Are you a member of the Louisiana Vocational Agriculture Teachers Association?
   ___ Yes ___ No
3. Do you teach any science course other than agriculture? ___ Yes ___ No
   If yes, what science course(s) do you teach? _____
4. What year did you receive your bachelors degree? _____
5. In which area of the state do you teach: (Circle one) I II III IV
6. How many agriculture classes do you teach this semester? _____
7. How many students are enrolled in the agriculture classes that you teach this semester? _____ (If a student is enrolled in more than one class, count them only once.)
8. What agriculture courses do you teach this semester? (Circle all that apply)

6th Grade Agriculture	Agriscience I	Agriscience IV
7th Grade Agriculture	Agriscience II	Agricultural Lab
8th Grade Agriculture	Agriscience III	Cooperative Agricultural Education

9. What time periods do you prefer for inservice programs? (Please select your first three choices by marking them 1, 2, and 3.)

   _____ 2-3 hour night meeting during school year
   _____ 2-3 hour night meeting during summer
   _____ Half or whole day program on Saturday during school year
   _____ Half or whole day program on Saturday during summer
   _____ Programs at Bunkie Leadership and Inservice camp
   _____ Weekday workshop for one or more days during the school year
   _____ Weekday workshop for one or more days during the summer
   _____ Other (Specify) _____

10. Who do you prefer to present inservice programs? (Please select your first three choices by marking them 1, 2, and 3.)

   _____ University faculty members
   _____ State or area extension personnel
   _____ Industry representatives
   _____ Other teachers
   _____ Agricultural agency representatives (Farm Bureau, USDA, etc.)
   _____ Other (Specify) _____

Basic Curriculum Below are lesson topics from the Basic Curriculum which include science knowledge and skills. **Please indicate your level of familiarity with each lesson topic by circling the appropriate response to the right.** If you are unsure of the lesson content, review the basic curriculum.	**Your Level of Knowledge and Skills for Teaching this Area** 1 = I do not have the knowledge and skills 2 = I have some knowledge and skills 3 = I have sufficient knowledge and skills 4 = I have strong knowledge and skills			
Plant Science				
1. Structure of Plants	1	2	3	4
2. Physiology of Plants	1	2	3	4
3. Fertilizers and Plants	1	2	3	4
4. Environmental Factors affecting Plant Growth	1	2	3	4
5. Weed Control	1	2	3	4
6. Moisture Control	1	2	3	4
7. Systems Used to Classify Plants	1	2	3	4
8. Improvement of Plants for Quality Seed Selection	1	2	3	4
9. Applied Agricultural Genetics	1	2	3	4
10. Propagation	1	2	3	4
11. Plant Diseases	1	2	3	4
12. Control of Plant Diseases	1	2	3	4
13. Control of Insects	1	2	3	4
Entomology				
1. Types of Common Insects and Their Life Cycles	1	2	3	4
2. Concepts and Principles of IPM	1	2	3	4
3. Identification, Biology, and Control of Termites	1	2	3	4
Environmental Science				
1. Environmental Protection	1	2	3	4

Basic Curriculum Below are additional lesson topics from the Basic Curriculum which include science knowledge and skills. Please **indicate your level of familiarity with each lesson topic by circling the appropriate response to the right.**	**Your Level of Knowledge and Skills for Teaching this Area** 1 = I do not have the knowledge and skills 2 = I have some knowledge and skills 3 = I have sufficient knowledge and skills 4 = I have strong knowledge and skills			
Soil Science				
1. Definition of Soil	1	2	3	4
2. Factors Affecting Soil Formation	1	2	3	4
3. Composition of Soil	1	2	3	4
4. Physical Properties of Soil	1	2	3	4
5. Biological Properties of Soil	1	2	3	4
6. Chemical Properties of Soil	1	2	3	4
7. Soil Acidity and Alkalinity	1	2	3	4
8. Liming to Correct Soil Acidity Selection	1	2	3	4
9. Nutrient Requirements of Plants	1	2	3	4
10. Organic and Inorganic Fertilizers	1	2	3	4
11. Application of Fertilizers	1	2	3	4
12. Classification of Soil Water	1	2	3	4
13. Soil Erosion and Conservation	1	2	3	4
Animal Science				
1. Anatomy and Physiology of Livestock	1	2	3	4
2. Reproductive Processes of Mammals & Poultry	1	2	3	4
3. Anatomy and Physiology of Reproduction	1	2	3	4
4. Breeding Methodology	1	2	3	4
5. Classification and Functions of Nutrients	1	2	3	4
6. Sources of Nutrients	1	2	3	4
7. The Digestive Process	1	2	3	4
8. Ration Formulation for Ruminants & Non-ruminants	1	2	3	4
9. Livestock & Poultry Diseases & Methods of Control	1	2	3	4
10. Types & Control of Livestock & Poultry Parasites	1	2	3	4

Advanced Curriculum Below are lesson topics from the Advanced Curriculum which include science knowledge and skills. Please **indicate your level of familiarity with each general topic by circling the appropriate response to the right.**	**Your Level of Knowledge and Skills for Teaching this Area** 1 = I do not have the knowledge and skills 2 = I have some knowledge and skills 3 = I have sufficient knowledge and skills 4 = I have strong knowledge and skills			
Plant Science				
1. Tissue Culture and Plant Breeding	1	2	3	4
2. Genetic Engineering and Plant Breeding	1	2	3	4
3. Plant Production Systems	1	2	3	4
4. Soilless Plant Culture (Hydroponics)	1	2	3	4
5. Irrigation Systems	1	2	3	4
Animal Science				
1. Resistance to Diseases & The Immune System	1	2	3	4
2. Antimicrobial Therapy and Vaccinations	1	2	3	4
Natural Resource Management				
1. Ecosystems and Populations	1	2	3	4
2. Wildlife Production Requirements	1	2	3	4
3. Habitat Analysis and Evaluation	1	2	3	4
4. Wildlife Conservation	1	2	3	4
5. Advantages and Disadvantages of Pesticides	1	2	3	4
6. Safe Use of Agricultural Chemicals	1	2	3	4
7. Pesticide Application Methods	1	2	3	4

Agricultural Science Skills Below are a list of agricultural and science skills which have been identified as appropriate for teaching the new agriscience curriculum. Please **indicate your level of familiarity with each skill or type of skills by circling the appropriate response to the right.**	**Your Level of Knowledge and Skills for Teaching this Area** 1 = I do not have the knowledge and skills 2 = I have some knowledge and skills 3 = I have sufficient knowledge and skills 4 = I have strong knowledge and skills			
1. Using, adjusting, & maintaining a dissecting microscope	1	2	3	4
2. Using, adjusting, & maintaining a monocular microscope	1	2	3	4
3. Taking tissues specimens & making microscope slides	1	2	3	4
4. Selecting specimens for use with a dissecting microscope	1	2	3	4
5. Drying & mounting plants	1	2	3	4
6. Plant breeding techniques	1	2	3	4
7. Tissue culture techniques	1	2	3	4
8. Asexual plant propagation	1	2	3	4
9. Culturing bacteria & fungi for identifying plant diseases	1	2	3	4
10. Hydroponics techniques	1	2	3	4
11. Organic agriculture production techniques	1	2	3	4
12. Mixing & applying pesticides	1	2	3	4
13. Calibrating fertilizer applications	1	2	3	4
14. Collecting & mounting insects	1	2	3	4
15. Embryo transfer techniques	1	2	3	4
16. Artificial insemination techniques	1	2	3	4
17. Proper handling & examination of real animal tissue specimens such as a digestive tract	1	2	3	4
18. Taking blood samples	1	2	3	4
19. Administering vaccines & medications	1	2	3	4
20. Using implants	1	2	3	4
21. Using a microscope to determine parasite infestations	1	2	3	4
22. Conducting simple, basic science experiments	1	2	3	4

Appendix B

Cover Letters and Followup Materials

LOUISIANA STATE UNIVERSITY
AND AGRICULTURAL AND MECHANICAL COLLEGE
School of Vocational Education
College of Agriculture

November 16, 1991

1~ 2~ 3~
4~
5~
6~, LA 7~

Dear 2~:

Many questions exist about the future directions and challenges facing agricultural education. One of these challenges is the incorporation of the new agriscience curriculum into Louisiana's programs.

Before efforts can be started to help teachers, information is needed to determine the technical in-service needs of teachers in the areas covered by the new curriculum.

This study is designed to determine the in-service needs of teachers. Responses are needed from every Louisiana agriscience teacher if we are to be successful in planning appropriate in-service activities.

Please complete and return the enclosed questionnaire in the stamped, self-addressed envelope provided AS SOON AS POSSIBLE. This project is being conducted under a grant from the State Department of Education that expires in December. It will save everyone a lot of time in following up non-respondents if you will make a special effort to return the questionnaire today or tomorrow. If you absolutely cannot return it today or tomorrow, please be sure to mail it no later than Tuesday, December 3.

If you have any questions, please call Dr. AnnaBeth in the LSU School of Vocational Education (504-388-5752). Thanks for your cooperation.

Sincerely,

AnnaBeth Neason
Assistant Professor and
Project Director (#8~)

Enclosures

Baton Rouge • Louisiana • 70803-5477 • 504-388-5748 • FAX 504-388-5755

HELP!!!

We sent you a questionnaire (it was bright yellow) the week before Thanksgiving. As of today, I have not received your response. **Please** complete and return your questionnaire today. My deadline is approaching and I need to include your information in the final report.

Sincerely,

AnnaBeth Neason
Project Director

1 The first postcard sent after the initial mailing of the questionnaire.

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LOUISIANA STATE UNIVERSITY
AND AGRICULTURAL AND MECHANICAL COLLEGE
School of Vocational Education
College of Agriculture

December 4, 1991

2~ 3~ 4~
5~
6~
7~, LA 8~

Dear 3~:

Help!!

I sent you a questionnaire shortly before Thanksgiving. As of today, I have not received your completed response.

One of the challenges facing agriscience education in Louisiana is the incorporation of the new agriscience curriculum into our programs. Before we can plan in-service programs to help you with the new curriculum, information is needed to determine your technical in-service needs. This study will be used to plan in-service programs for agriscience teachers.

Please complete and return the enclosed questionnaire by **Wednesday, December 10**. I have provided a stamped, self-addressed envelope for your return. This project is being conducted under a grant from the State Department of Education that expires this month. It will save a lot of time in following up non-respondents if you will make a special effort to return the questionnaire today or tomorrow. Please get your response in as quickly as possible.

If you have any questions, please call AnnaBeth Neason in the LSU School of Vocational Education (504-388-5752). Thanks for your cooperation.

Sincerely,

AnnaBeth Neason
Assistant Professor and
Project Director (#9~)

Enclosures

Extension and International Education • Industrial Education • Agricultural Education
Baton Rouge • Louisiana • 70803-5477 • 504-388-5748 • FAX 504 388 5755

PLEASE!!!

As of December 6, 1991 I had not received your completed survey. I really need you to complete and return the survey **TODAY** if at all possible. I will have to follow up non-respondents by telephone at the end of this week. This information is **VITAL** to planning next year's in-service for **YOU**. Thanks.

AnnaBeth Neason
Project Director

2 The second postcard sent out. This card was a follow-up to the second mailing of the questionnaire.