AN ASSESSMENT OF COLLABORATION EFFORTS BETWEEN TEACHERS ATTENDING THE OKLAHOMA AGRISCIENCE SUMMER INSERVICE

By

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THE OKLAHOMA AGRISCIENCE

SUMMER INSERVICE

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CHAPTER I

INTRODUCTION

In the past decade, there have been many calls for educational reform in the United States. Parents, teachers, and educational professionals have called for new and innovative approaches to teaching English, Mathematics, and Science (Connors & Elliot, 1995). According to A Nation at Risk (National Commission on Excellence Education, 1983), "There was a steady decline in science achievement scores of US students" (p. 9). The direction of science achievement scores has not been rectified. Former Secretary of Education William Bennett (1988) wrote "A new assessment places American science students in rough international perspective" (p. 13). Ten-year-olds placed 8th among 15 countries tested. Fourteen-year-olds placed 14th out of 17 countries. These poor science test results have increased the necessity for improved science education for American students.

Ordinarily, these demands have only led to increased science requirements, more hours added to the school day, or more days added to the school year. A Nation at Risk (1983) stated that, "School districts . . . should strongly consider 7-hour school days, as well as a 200 to 220-day school year" (p. 29). However, The American Association for the Advancement of Science in Project 2061, Science for all Americans (1989) stated that "A fundamental premise of Project 2061 is that the schools do not need to be asked to teach more and more content, but rather focus on what is essential to scientific literacy and to teach it more effectively" (p. 4). The National Science Board Commission on Precollege Education in Mathematics, Science, and Technology (1983) stated a compelling need for curricula that exercised science and math application in practical situations to improve student learning. This indicated a new method of teaching science is needed.

Policymakers, educators, employers, scholars, and social critics have endorsed vocational education reform that dealt with "integration" (Stasz, Kagnoff, & Eden, 1994). According to researchers (Stasz and Grubb, 1991; O'Neil, 1992) vocational educators as well as critics of vocational education regarded integration as a curricular reform that improved the academic content of vocational education as well as the practical application of science and math concepts and helped prepare students for employment in an ever-changing world of work.

Statement of the Problem

To assist in training teachers to develop programs that integrate science into agricultural education, Oklahoma Department of Vocational and Technical Education (ODVTE) initiated the Oklahoma Summer Agriscience Inservice (OASI). The purpose of the inservice was to help increase collaborative activities between agricultural education teachers and science teachers. The problem of this study was the need to assess the impact of the Agriscience Summer Inservice on increasing collaboration efforts between secondary agricultural and science teachers.

Purpose of the Study

The purpose of this study was to describe collaboration activities between secondary agricultural and science teachers before and after attending the Oklahoma Agriscience Summer Inservice.

Objectives of the Study

Five objectives were established to achieve the purpose of this study. The objectives were to:

1. Describe the demographic characteristics of the participants of the Oklahoma Summer Agriscience Inservice.
2. Determine the impact of the Oklahoma Agriscience Summer Inservice on collaboration efforts between secondary agricultural and science teachers.
3. Identify barriers existed that prevented secondary science and agricultural teachers from collaborating.
4. Describe secondary science teachers' perceptions regarding agriculture.
5. Describe secondary agriculture teachers' perceptions regarding science.

Operational Definitions

For the purposes of this study, the following terms were defined accordingly:

Agriscience - "Instruction in agriculture emphasizing the principles, concepts, and laws of science and their mathematical relationships supporting, describing, and explaining agriculture." (Buriak 1989. p. 4)

Collaboration - Science and agricultural teachers working together in some educational undertaking.

Scope

The scope of the study included 32 secondary agricultural education and science teachers from 16 different schools, who attended the Oklahoma Summer Agriscience Inservice on June 2-4, 1997.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to provide an overview of the available literature in agricultural education and science as it relates to collaboration. The review of literature has been divided into the following sections: 1) Implications of Integration, 2) Teacher Inservice Programs, 3) Agriscience Programs in Other States.

Introduction

In recent years, Agricultural Education Programs have faced declining enrollments, a shifting of the job structure in the agricultural industry, and changing clientele in agricultural education. The agricultural industry anticipates a decrease of 163,000 production types of jobs from 1987 to the year 2000 according to the Monthly Labor Review (1987). During that same time period, it was predicted that 47,000 farm manager positions would be created and life science jobs were expected to increase by 21%. This increase symbolized approximately 30,000 new science oriented jobs such as plant and animal genetics, biotechnology, and medicine (Silvestri & Lukasiewicz, 1987).

In 1988, the National Research Council's Committee on Agricultural Education stated that major curricular revisions were needed within secondary agricultural education programs. One of the main conclusions of the Committee was that the agricultural education curriculum in high schools has failed to keep up with modern agriculture. The Committee recommended major changes in course content of the agricultural education curriculum. The committee stated that the agricultural education curriculum be updated and revised to contain more scientific principles, with an emphasis on relating that content to the increasingly scientific and technical nature of the field of agriculture.

Today's agricultural education programs are changing in order to meet the needs of both students and society (Hughes and Barrick, 1993). These changes have made the integration of academics and vocational education a reality in many schools. The most recent change in integrated education is an increased emphasis on agriscience (Camp, 1994). Buriak (1989, p. 4) defined agriscience as "Instruction in agriculture emphasizing the principles, concepts, and laws of science and their mathematical relationships supporting, describing, and explaining agriculture." In 1994, Lee described agriscience education as, "The emphasis is on the principles of science that undergrid agriculture." (p. 2)

Many agricultural educators have adopted and developed inventive programs that integrate science into the curriculum. But, if teachers have a low degree of agriscience knowledge, they will be less likely to include agriscience topics in the curriculum. Hashkew (1986) stated that prior teacher knowledge of subject matter contributed greatly to the transformation of the written curriculum into an active curriculum component in the classroom. In recent studies about agriscience, researchers have concluded that there is an increased need for agriscience inservices to assist teachers in integrating science concepts into their curriculum (Haggerton & Williams, 1998; Thompson & Schumaker, 1997; and Welton, Harbstreit, & Borchers, 1994). To promote developing programs that integrate science into agricultural education by initiating such programs as the Oklahoma Summer Agriscience Inservice, more information is needed on the effectiveness of such a program.

Implications of Integration

As with agricultural education, there is a need to re-evaluate the quality of science education available to secondary students. Many believe that science education in America functions not to nurture children's natural curiosity but to stifle it with textbooks of tedious facts and terms (Barret, Cowley, Hager, & Springen, 1990). Science teachers are advised to stress the concrete, stimulating aspects of science using a "hands-on" method of teaching (Fort, 1990). The hands-on method makes it possible for students to understand science concepts and processes through their kinesthetic senses, rather than totally through textbooks and lectures (Fort, 1990).

Agricultural educators have traditionally advocated a "hands-on" approach to teaching and learning (Newcomb, McCracken and Warmbrod, 1993; Phipps and Osborne, 1988). Many of the hands-on activities have traditionally been intended to develop the procedural and psychomotor skills in students considered necessary for achievement in agricultural occupations (Johnson, 1989). Teachers in agricultural education have placed considerably less importance on the use of hands-on activities as a method for teaching and/or strengthening student learning of science principles (Osborne, 1993).

One of the principal expectations of agriscience is to provide students with a hands-on, application-oriented science education (Lee, 1994). According to Budke

(1991), agricultural education provides a means to teach biological sciences such as genetics, photosynthesis, nutrition, pollution control, water quality, reproduction, and food processing. The use of live examples as a part of the classroom for experimentation and observation provided an effective method of teaching science concepts (Budke, 1991).

The individual goals of both science and agricultural education could be successfully accomplished through the joint mission of academic and vocational integration. Applied education can advance educational reform by providing students with more opportunities to learn and use basic knowledge in practical situations (Grey, 1991; Grub, 1991; Writ, 1991).

Many studies have shown that students taught science using agricultural examples perform equal to or better than students taught science using traditional science examples. Roegge and Russel (1988) conducted a study to determine how well agriculture and biology could be integrated in a high school setting. They found that the integrated approach was superior to the traditional approach in producing higher overall achievement. Whent and Leising (1988) reported that, "agricultural students in test schools achieved slightly higher on the biology test than did bioscience students" (p. 14). The researchers concluded that agricultural students were mastering the state science standards on an equal level with students in general science classes. Enderlin and Osborne (1991) studied science achievement of middle school science students. The researchers compared a laboratory oriented agricultural approach with a traditional science instructional approach in teaching a plant science unit of study. Enderlin and Osborne also used a post-test only, control group design for their study. The researchers concluded that, "student acquisition of science knowledge differs significantly between those students who receive traditional science instruction" (p. 7). The students with experience in agricultural education received higher scores.

Several obstacles were identified to integrate academic and vocational education by researchers (Grub, Davis, Lum, Plihal, and Morgaine, 1991; Bodilly, Ramsey, Stasz, and Eden, 1993). Working with students from different skill levels, planning time, low achieving students, the need for additional teacher inservice, remedial levels of academic integration and changing their curriculum were factors that teachers considered as barriers to integrating academic and vocational education. While obstacles existed for teachers integrating academic and vocational education, the literature noted that the benefits outweighed the barriers.

Teacher Inservice Programs

Historically, recognition of the importance and provision of suitable structures, models, and mechanisms for inservice staff development in schools has been absent (Pratzner, 1987). It is only recently, and largely as result of such reports as the Holmes Group report (1986) and the Carnegie Task Force report on teaching (1986), that teacher education has been thought of as a process of career development that continues throughout a teacher's professional life span. The National Commission for Excellence in Teacher Education (1985) puts it this way "Teacher education is not a single, time-bound activity, but a continuing process of career development ..... Teachers have a right to expect an ... integrated program for continued professional development" (p. 2). Instead, very often, inservice training for working teachers is "keyed to taking certain courses, often is fragmented and unfocused, and does not relate to a specific area of knowledge or improved classroom technique" (Committee for Economic Development 1985, p. 78). According to the Committee for Economic Development, staff development in education "is a low-funded, low-priority budget item for most school boards. It has traditionally been viewed as a pay increase for credits earned, with little or no attention paid to the specific needs of the individual or the school" (p. 100).

Teachers of agriculture continually want and need inservice education, particularly in technical subject matter (Barrick, Ladewig, and Hedges, 1983). Logically, this need is more pronounced when the teachers are asked to teach new subject matter or subject matter in which they have had little previous training like that of agriscience.

In developing an inservice education program, assessing the learner needs is an important early step in the process. Involving the learners in the process of planning an inservice education program increases the likelihood of implementing relevant program (Walters & Haskell, 1989).

Much of what we know about the efficiency of professional development programs in science education is based on anecdotes and on reports from teachers, principal investigators, and program directors involved with the programs themselves. The teachers stated repeatedly in such reports that they felt empowered by their participation and gained a refined sense of professionalism (National Research Council, 1996). The teachers also felt they had enhanced their content knowledge and were more comfortable in using inquiry-based methods of instruction in their classrooms. This kind of subjective information is important and useful, but the overwhelming majority of programs that were investigated by the National Research Council (1996) have no formal devices for determining effectiveness of programs by evaluating how students fared after their teachers participated in professional development programs.

It is important for program developers to know the effects of professional development programs on classroom behavior of teachers, such as magnitude to which they embody the content and process elements of their training into their classroom teaching. Evaluations of student performance, what the students know and are able to do as a result of their teachers' professional development activities, is an obvious element that must be included in formal evaluations (National Research Council, 1996). Ultimately, an evaluation mechanism is needed to be designed in order to collect longitudinal data to measure effects of professional development programs for teachers on their students, including how they learn and make decisions beyond high school. Acquiring such data will require tenacity to collect and analyze comparable data over periods of 5-10 years (National Research Council, 1996).

Program evaluation can take many forms. Not all professional development programs need to be evaluated in the same way. For example, a lecture series does not require as extensive an evaluation as a program designed to foster systemic change. Evaluation will be most effective if it is designed in the introductory planning stages of a program, if it measures the success of a program against its stated goals, and if it continues throughout the life of the program and, for students, beyond (National Research Council, 1996).

The National Research Council (1996) outlined the following suggestions in order to help program planners include evaluation as part of their program:

- Define specific, realistic, important, and measurable program goals.
- Identify scientific content and science-process skills that are appropriated for teachers and their students.
- Choose instructional strategies and follow-up activities that are consistent with the objectives of the program and reinforce core concepts.
- Establish mechanisms for receiving continuing participant feedback.
- Establish, before the program begins, procedures and instruments for collecting overall program-evaluation data.
- Examine a program's cost effectiveness or efficiency.

The last issue is bewildering because it addresses the age-old problem of "comparing apples and oranges". How can one compare the relatively high cost of a high school biotechnology program, with its expensive equipment, to the relatively low cost of an elementary-school science program that serves hundreds of teachers? Is the elementary school science program more cost efficient because it has a lower pre-teacher cost? (National Research Council, 1996).

Continuing evaluation can include both formal and informal devices to help program facilitators to analyze problems as well as successes during various stages of program implementation. Program staff can conduct informal evaluation. Continuing evaluation often uses questionnaires, interviews with participants, or self-reports in the form of journal excerpts; these types of evaluation should rely strongly on participants' comments so that appropriate changes can be instituted into the program. Often, continuing evaluation leads both to better ways to accomplish the initial goals and to changes in the goals themselves (National Research Council, 1996). The development and improvements in programs that result from observations made during continuing evaluation are desirable. However, the changes and improvements in programs that result from continuing evaluation confound long-term evaluation of program efficiency because it is aiming at a moving target.

Formal evaluation of the impact of an overall program requires long-term strategies for data gathering and analysis that begin with the program's design and continue throughout the life of the program. Most evaluation stops when the program ends, although it can take years for the impact on students to become evident. Usually, long-term data are not collected, although their collection might be as simple as calculating the number of science electives taken by students of a teacher in a middle-school program. Such data provide a quick indicator of students' interest in science, which might or might not reflect good science teaching in earlier grades (The National Research Council, 1996).

The National Research Council (1996) found a lack of overall program evaluations connecting teacher participation in professional development with improvement of teaching skills or students performance. To determine the ultimate impact of a program, long-term evaluation is needed to keep track of program participants and how they embody new information and methods into their classroom activities.

Whether evaluation is intended to be continuing or summary, fundamental questions must be addressed: What are teachers learning? Is sufficient pedagogy being modeled in the professional development programs? Does the program address "real needs" of teachers? Does the program hold promise of favorably affecting student learning in science and agriculture?

Having an evaluator involved in the planning of the program can help to assure that program objectives are clear and focused, that the evaluator will begin to think about evaluation tactics and instruments before the program begins, and that the program will embody suitable points for the evaluation of progress and midcourse correction. As one increases one's focus on program evaluation, one needs to be careful not to contrive neat evaluations by looking for easily measured outcomes or easily administered tests at the expense of effective program design and implementation (National Research Council, 1996).

Agriscience Programs in Other States

It is not uncommon for agricultural teachers to spend many years teaching in the same school and yet have little or no idea what the biology teachers are doing in their classrooms. In California, The Agriscience Institute and Outreach Program was designed to bridge the gap between agriculture and science education (Whent & Greenler, 1991 and Whent, 1992).

The Agriscience Institute and Outreach program tested a model to integrate agriculture and science education in a variety of high schools across the Untied States. The program model focused on integrating agriculture and science education in two phases. The first phase involved forming collaborative science and agriculture teaching teams to develop and test agriscience laboratory exercises. Ten agriculture and science teacher teams attended a two-week Agriscience Institute at the University of Wisconsin, Madison Campus. During the institute, the teacher teams working in collaboration with university researchers developed Agriscience instructional materials, In the Fall of 1991, the teacher teams returned to their classrooms to field teach the instructional materials that had developed (Whent, 1994). The second phase of the program comprised a two-day train-the-trainer meeting at the University of California, Davis. The trained teachers then conducted workshops in their region of the Untied States. (Whent, 1994).

In a follow-up study of resource sharing between agricultural and science teachers who participated in the Agriscience Institute and Outreach Program by Whent (1994), the following conclusions were drawn: 1) Participation in the program increased the cooperation and resource sharing between agricultural and science teachers; 2) Through information sharing, team building, and assigned tasks, it is possible to increase the amount of cooperation of both agricultural and science teachers; 3) A major factor inhibiting the science teachers from utilizing agriculture department resources was a lack of awareness of both the resources available and similarities in curriculum; 4) Agricultural teachers had higher gains in cooperation and sharing of resources during the workshop phase of the program (Phase II), where the science teachers had the greatest gains in cooperation and sharing of resources during the team building, instructional materials development, and testing phase of the program.

In Mississippi, agricultural educators developed two pilot courses in agriscience for the 1991-92 school year. One course, Introduction to Agriscience, was designed as a one-hour, 9th or 10th grade level course. The other, Agriscience I, was designed as a two-hour, 11th or 12th grade level course. A third course, Agriscience II, was designed as a two-hour, 11th or 12th grade level course. Agriscience II was implemented during the 1992-93 school year (Newman & Johnson, 1994). In a report on the development of the courses, Johnson (1991) stated, "The courses were designed to teach the scientific principles which form the basis of modern food and fiber industry and to provide students with active, hands-on learning experiences that emphasize the scientific method in the study of agriculture" (p. 1).

Agricultural education supervisory staff members of the Mississippi State Department of Education selected 42 teachers to pilot-test the new agriscience courses for a three-year period. During June, 1991, a two-week, intensive inservice workshop was held for all teachers selected to teach the agriscience course (Newman & Johnson, 1994).

During the first year of the pilot test, the courses were well received. Agriculture teachers, school administrators, guidance counselors, and science teachers all strongly agree that science credit should be awarded for the course (Johnson & Newman, 1992; Newman & Johnson, 1992).

In 1992 at Kansas State University, a three-week institute on water quality was administered. The instate was planned and coordinated through a cooperative effort between the College of Arts and Sciences, the College of Agriculture, the College of Engineering, the College of Education, the Center for Science Education, and the public school system (Welton, Harbstreit, & Borchers, 1994). Agricultural education teachers in Kansas and Missouri were advised and invited to apply for attendance of the inservice. Twenty-five teachers were selected and attended in the summer of 1992.

The institute included four components of instruction: (a) basic science concepts; (b) applied science concepts; (c) teaching methodology; and (d) curriculum development. The teachers spent the mornings of the institute receiving instruction on technical concepts while in the afternoons, were devoted to methodology and curriculum development. In the following school year, the teachers' field-tested the materials they developed and provided feedback at the fall and spring follow-up sessions (Welton, Harbstreit, & Borchers, 1994). On site supervision was provided by institute staff to assist teachers, principles, and counselors with the implementation of the integrated curriculum into the secondary schools of the participants.

Welton, Harbstreit, & Borchers (1994) concluded that the summer institute improved scientific literacy among secondary agricultural teachers in rural schools, provided support from university staff in both education and the content fields, increased the teachers' own content knowledge, and provided them with science methods pedagogy. Upon returning to their classrooms, institute staff observed changes in the participants teaching strategies endorsed during the summer institute. Participants were also working collaboratively with faculty in other disciplines in their schools to integrate the basic and applied science concepts found in the teacher prepared curriculum materials.

Summary

The possibility for collaboration between agriculture and science teachers is immense. Teachers are quick to see the links between agriculture and science when they are brought together and their discussion moves to information sharing and specific teaching techniques. Agriculture and science teachers can learn to work together so their students can study agriculture and science in an integrated setting. Ultimately, the prosperity and long-term benefits of the integration between science and agriculture will be reflected in the student performance. If classroom experiences change through increased integration, students will be changed. The thrill of hands-on involvement, and understanding of the overlap of the fields of science and agriculture, and positive experiences within each field can change the way teachers view integration and perhaps more importantly, learning.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this chapter is to illustrate the methods used and the procedures followed in conducting this study. This chapter will describe the instrument, its design and implementation, and its data analysis methods.

Institutional Review Board (IRB)

Federal regulations and OSU policy require review and approval of all research studies that involve human subjects before investigators can begin their research. The OSU Research Services and the IRB conduct this review to protect the rights and welfare of human subjects involved in biomedical and behavioral research. In compliance with regulations, this study was granted permission to continue and was assigned the following number: AG-98-027.

efforts; and 4) specific collaborative activities used by the teacher about any collaborative activities that may have taken place. The bi-polar adjective scale was used to observe any changes in perceptions over time.

The same bi-polar adjective scale was used in all three questionnaires. The purpose of using the same scale was to determine if the inservice had any effect on the teachers perceptions. The bi-polar adjective scale achieves this by using two opposing adjectives to describe a specific perception. In the case of the science teachers, the researcher was trying to identify any changes in their perceptions' on agriculture in general. In the case of the agricultural education teachers, the researcher was trying to identify changes in their perceptions' on science in general. Each of the adjective pairs were selected by the researcher on what specific perceptions that were wanting to be measured. A scale of 1 through 7 was chosen to rate each bi-polar scale with 1 being perceived as the extreme positive and 7 as the extreme negative.

The researcher utilizing graduate students in the department of Agricultural Education, Communications and 4-H Youth Development at Oklahoma State University conducted a pilot test of the instrument. These individuals were questioned and provided input concerning the questionnaire format, clarity of questions, and willingness to respond. As a result of the pilot test, some questions were revised for clarity.

A coding system was developed by the researcher in order to keep the anonymity of the individuals being questioned. A small detachable paper that asked for participants' name and school, was attached to the pre-questionnaire. The researcher was then able to barriers to collaboration; 2) usefulness of the inservice; 3) implications of collaboration efforts; and 4) specific collaborative activities used by the teacher about any collaborative activities that may have taken place. The bi-polar adjective scale was used to observe any changes in perceptions over time.

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A coding system was developed by the researcher in order to keep the anonymity of the individuals being questioned. A small detachable paper that asked for participants' name and school, was attached to the pre-questionnaire. The researcher was then able to give each respondent a code number. The code number was used only for tracking purposes in the follow-up questionnaire. All data was securely stored by the researcher and shredded upon the completion of the study.

Collection of Data

A pre-inservice questionnaire (Appendix I & II) was given to each participant of the Agriscience Summer Institute before the start of the inservice on June 2, 1997, with 100% response rate. A post-inservice questionnaire (Appendix III & IV) was administered to the participants at the close of the inservice on June 4, 1997. Once again, all participants completed the questionnaire. Then, on February 18, 1998, a cover letter (Appendix VII) and a follow-up questionnaire (Appendix V & VI) were sent via mail, to 31 participants. Eleven out of the 31 (35.5%) responded after the first mailing. A second cover letter (Appendix VIII) and an additional questionnaire were mailed on February 28, 1998 to those who had not responded. Six (19.4%) more responded after the second mailing . A phone call was made to those schools who had not responded and two (6.5%) additional questionnaires were conducted over the phone. The non-respondents were compared to the respondents and no significant differences were found. The total response rate was 61.3% with 13 (87.5%) of 16 schools that participated in the inservice responded (Table I).

TABLE I

SUMMARY OF RESPONSE RATE

Questionnaire	Agricultural Teacher (N=17)	Science Teacher (N=15)	Schools (N=16)
Pre-inservice (6/2/97)	17	14	16
Post-inservice (6/4/97)	17	14	16
Follow-up (2/18/98)	12	5	14

Analysis of Data

Data were analyzed using descriptive statistics. All findings were reported in the aggregate with no individuals of schools being identified singly.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The purpose of this chapter is to present the data collected from the questionnaires used to conduct the study. The purpose of the study was to gather information on how collaboration between agricultural and science teachers was effected by participating in the Oklahoma Summer Agriscience Inservice. The data are organized according to and corresponding with the objectives of the study.

Findings Related Demographics

The first objective of the study was to describe demographic characteristics of the Agriscience Inservice participants. Selected characteristics included: gender, years of teaching experience, years at current school, high school's total enrollment, and classes taught.

As shown in Table II, more than 81% of the participants were male. The 16 male agricultural teachers comprised of 50% of the group, while the 10 male science teachers were 31.3% of the total.

TABLE II

DISTRIBUTION OF PARTICIPANTS AS TO GENDER

Gender	Subject Area	Frequency (N=32)	Percentage
Male	Science	10	31.3
Female	Science	5	15.6
Male	Agriculture	16	50.0
Female	Agriculture	1	3.1
TOTAL		32	100.0

Data in Table III show that the agriculture teachers have been teaching an average of 11.5 years with a range between one to twenty-four years and the science teachers have been teaching an average of 13.7 years with a range of two to thirty-eight years. The average teaching experience of the entire group is 12.6 years.

TABLE III

DISTRIBUTION OF PARTICIPANTS BASED ON TEACHING EXPERIENCE

Subject Area	Range (years)		Mean
Agriculture	2	37	13.7
Science	1	24	11.5
TOTAL			12.6

Table IV shows that the agriculture teachers have been at their current teaching assignment an average of 7.8 years with a range of one to twenty-three years. By comparison, the science teachers have been at their current teaching assignment an average of 11.1 years with a range from two to thirty years.

TABLE IV

DISTRIBUTION OF PARTICIPANTS BASED ON YEARS AT CURRENT SCHOOL

Subject Area	Range (years)		Mean
Agriculture	1	23	7.8
Science	2	30	11.1
TOTAL			9.4

Table V shows that the high school enrollment size ranges from 6-A to B. The majority of the participants (31.3%) teach at a high school with the enrollment between 300-235 students. Schools with enrollment between 700-470 & 235-190 were both represented in the minority at 6.3% each.

TABLE V

DISTRIBUTION OF HIGH SCHOOL ENROLLMENT BY PARTICIPANTS

Enrollment		Frequency (n=16)	Percentage
4200-1200	(6A)	4	25.0
700-470	(4A)	1	6.3
470-360	(3A)	2	12.5
360-300	(2-A)	3	18.8
300-235	(A)	5	31.3
235-190	(B)	1	6.3
TOTAL		16	100.0

Table VI indicates that a total number of six agricultural teachers teach Agriculture Power, five teachers teach Natural Resources, and seven teachers teach Agscience I. Biology and Biology II were the most common classes taught by the

Biology II.

TABLE VI

SUMMARY OF CLASSES TAUGHT BY INSERVICE PARTICIPANTS

Teacher	Frequency	Classes
Agriculture	7	Agriscience I
	6	Agriculture Power
	5	Natural Resources
	4	8th Grade Agriculture
	3	Agriscience II
	3	Equine Science
	2	Animal Science
	2	Biotech
	2	Forestry
	1	Agricultural
	1	Communication
	1	Crop & Soil Science
	1	Aquaculture
		Agricultural Economics
Science	4	Biology
	2	Biology II
	1	Environmental Science
	1	Computer
	1	Applied Biology
	1	Chemistry
	1	Zoology
	1	Ecology
	1	Middle School Science
	1	Physical Science

Impacts of Inservice on Collaboration

Objective two of the study was to determine the impact of the Oklahoma Agriscience Summer Inservice on collaboration between agriculture and science teachers. A part of this was to determine why teachers participated in the inservice. The responses in Table VII show that the reason most of teachers, both agriculture and science, enrolled in the inservice was to learn more about integrating the two subjects areas and get more ideas for the classroom.

TABLE VII

PARTICIPANTS REASONS FOR PARTICIPATING IN INSERVICE

Teacher	Frequency	Response
Agriculture	6	Integrate science and academics.
	6	Receive new ideas on how to present science.
	2	Interact with science teacher
	1	The school's and my own self-interest in team teaching.
	1	Needed to attend an inservice.
	1	Would like to science certify.
	1	Expose science teacher to Agriscience
Science	4	The agriculture teacher asked.
	7	Ideas on how to incorporate agriculture and science.
	1	Want to work with the agriculture program to better learning for students.
	1	Work well with the agriculture teacher.
	1	Sounded interesting.
	1	You can't separate science from agriculture.

It was felt that another aspect of determining impact on collaboration would be to investigate expectations for the inservice. Table VIII shows that the teachers' expectations of the inservice are closely related to the reasons for enrolling for the inservice. Those expectations focused on learning how to integrate the two subject areas and to get more classroom ideas and materials.

TABLE VIII

SUMMARY OF PARTICIPANTS EXPECTATIONS OF THE INSERVICE

Teacher	Frequency	Response
Agriculture	9	Take home things that will help with classes.
	3	Better relations with science teacher.
	2	Help agriculture and science department work
	2	together to make students more aware of links between the two.
	1	Help with the new trend in agriculture.
	1	Better understanding of agriscience.
Science	6	To obtain materials and ideas.
	6	To get ideas for incorporating the agriculture and
	1	science programs where they overlap.

In the following section, data are presented which relate to findings regarding collaboration activities. Table IX is presentation of the extent of collaboration before attending the inservice, less than one-third of the total group reported that they had collaborated previously. Table V contains a summary of joint activities following participation in the inservice. In this it will be noted the 75% of the participants engaged in collaborative activities at this later point. In comparing these two sets of data, it can be seen that collaboration increased from 31.3% to 75% for the pre and follow-up periods respectively.

TABLE IX

COLLABORATIVE ACTIVITY BEFORE ATTENDING THE INSERVICE

Teacher	Collaborated	Frequency (N=32)	Percentage
Agriculture	Yes	7	41.2
	No	10	58.8
Subtotal			100.0
Science	Yes	3	20.0
	No	12	80.0
Subtotal			100.0
TOTAL	Yes	10	31.3
	No	22	68.7

TABLE X

COLLABORATIVE ACTIVITY AFTER ATTENDING THE INSERVICE

Teacher	Collaborated	Frequency (N=20)	Percentage
Agriculture	Yes	11	73.3%
	No	4	26.7%
Subtotal			100.0%
Science	Yes	4	80.0%
	No	1	10.0%
Subtotal			100.0%
TOTAL	Yes	15	75.0
	No	5	25.0

As indicated in Table XI, Resource Sharing was the predominate collaborative activity which took place between the two groups following the inservice. This was reported by 12 (60%) of the group who reported joint efforts. Team teaching was the next most popular type of collaboration reported by 5 (25%) of the group. Joint student projects were cited by the remaining 3 (15%).

TABLE XI

DISTRIBUTION OF TYPE OF COLLABORATIVE ACTIVITIES AFTER ATTENDING THE INSERVICE

Type of Activities	Frequency (N=20)	Percentage
Team Teaching	5	25.0
Joint Student Projects	3	15.0
Resource Sharing	12	60.0
TOTAL	18	100.0

Table XII shows the variety of collaborative activities that took place between the teachers. It can be seen that the range of activities was from plant science oriented activities to water and soil testing, to a wetlands project.

TABLE XII

SUMMARY OF COLLABORATIVE ACTIVITIES

Planned Activity	Actual Activity
Agriculture	Measured for wetlands project
	Plant propagation, bud grafting, and cuttings.
	Water requirements for marine and freshwater fisheries.
	Greenhouse management.
	Wildlife production.
	Share resources on viruses and bacteria.
	Grafting pecan trees.
	Traded classes and had students teach in each other's class.
	Soil and water tests.
	Field trips.
	Genetics.
Science	Water testing for various chemicals and pollution.
	Discussed resources for genetics and plant biology.
	Constructed model for wetlands.
	Soil testing
	Genetics.
	Invitro discussion.
	Field trips.

Table XIII shows the distribution by classes where collaboration took place. Natural Resources and Bio-Science were the classes where collaboration took place most often.

TABLE XIII

CLASSES WHERE COLLABORATION TOOK PLACE

Subject Area	Class	Frequency	Percentage
Agriculture	Natural Resources	4	36.4
	Horticulture	3	27.3
	Biotechnology	1	9.1
	Forestry	1	9.1
	Agricultural Science II	1	9.1
	Equine Science	1	9.1
TOTAL		11	100.1
Science	Bio-Science	2	28.6
	Physical Science	1	14.3
	Geology	1	14.3
	Environmental Science	1	14.3
	General Science	1	14.3
	Biology	1	14.3
TOTAL		7	100.1

When asked, "What was your students response to collaborating?", all teachers indicated that the students liked collaboration and wanted to continue with more. They also indicated that the students benefited from two points of view and that the teachers were being able to reinforce their objective.

Participants were asked if they collaborated with any other faculty other than the teacher the attended the inservice with in their school. Table XIV shows a majority (58.9%) of the agricultural teachers collaborating with other faculty members. The agricultural teachers most frequently worked with the speech or English teacher (Table

XV). While on 33.3% of the science teachers say they have collaborated with other faculty. The most common activities are with other science teachers and the math teacher (Table XV). if collaboration takes place and Table XIV summarizes what kind of collaborative activities they did with other faculty.

TABLE XIV

COLLABORATIVE ACTIVITY WITH OTHER FACULTY MEMBERS

Teacher	Frequency	Percentage
Science		
Yes	5	33.3
No	10	66.7
TOTAL	15	100.0
Agriculture		
Yes	10	58.9
No	7	41.1
TOTAL	17	100.0

TABLE XV

TYPES OF COLLABORATIVE ACTIVITIES CONDUCTED WITH FACULTY OTHER THAN INSERVICE PARTICIPANTS

Teacher	Activity
Agricultural	Exchange classes
	Work with English teacher on speeches
	Career Fairs
	Used math teacher's resources for forestry
	Guest speaker with Home science teacher
	Measuring skills with applied math
Science	Graphs with Math
	Writing scientific paper with English teacher
	Team teaching with math teacher in alternative school
	Middle school teachers on unit about Non-Venomous snakes and fish
	Metric system with math teacher and junior high science teacher
	Science fair

An overwhelming majority of the participants (89.5) indicated that the inservice helped increase collaboration as exhibited in Table XVI. All of the agriculture teachers indicated that it had helped while only two of the science teachers said it did not help with collaboration. Those that said that the inservice promoted collaboration indicated that inservice helped increase an awareness of the commonalties between the two disciplines as well as give them more ideas. Those that responded that the inservice did not help with collaboration gave no response on how the inservice could have better helped them to collaborate.

TABLE XVI

JUDGMENTS TO THE AGRISCIENCE INSERVICE INCREASING COLLABORATION

Teacher Response	Frequency (N=19)	Percentage
Agriculture		
Yes	14	100.0
No	0	
Subtotal		100.0
Science		
Yes	3	60.0
No	2	40.0
Subtotal		100.0
TOTAL	19	100.0

When asked "How could the agriscience inservice be better?" all the participants that responded indicated that they would like more hands-on activities. When they were asked "What is your general opinion of the Summer Agriscience Inservice?" all respondents gave positive responses as described in Table XVII.

TABLE XVII

GENERAL OPINIONS OF THE AGRISCIENCE INSERVICE

- Good.
- It proved very beneficial to me, there are several of the activities that were don at the inservice that I have used in class.
- The inservice is a great help to me. This one in particular has helped me teach different areas of agriscience to my students.
- I enjoyed it very much. Gave me a chance to work with science teachers and the administration recognizes it!
- Very good!
- Good for the teachers to receive new and updated materials for teachings.
- It was great.
- Good activity.
- It will work only when the teachers work to make it successful.
- Great. It was worth my time.
- Good.
- Very beneficial.
- Excellent.
- I felt it was very useful and needs to continue.

Barriers to Collaboration

Objective three was to determine the barriers that prevented agriculture and science teachers' form collaborating with each other. Time and scheduling conflicts was the response given by all respondents. Those two barrier responses were given from participants who did collaborate and participants who did not collaborate.

Science Teachers Perceptions of Agriculture

Objective four was to determine the science teachers' perception about agriculture before and after taking the Summer Agriscience Inservice. Table XVIII displays the analysis of the respondents based on a bi-polar adjective scale. The scale of 1 through 7 was chosen to rate each bi-polar scale with 1 being perceived as the extreme positive and 7 as the extreme negative. Table XVIII shows that the "simple/challenging" received the highest mean response at 5.40 in the pre-inservice questionnaire. The "simple/complicated" and "humorous/serious" were the only other two negative means at 4.93 and 4.67 respectively. Table XIX shows that the negativity of these bi-polar adjectives increased on the post-inservice questionnaire. The "simple/challenging" increased to 5.67 while the "simple/complicated" increased to 4.93. The adjectives "humorous/serious" increased to 4.73 and the pair "fun/work" showed negativity at 4.40. On the follow-up questionnaire (Table XX) "fun/work" and "serious/humorous" both increased to 4.80. The pair "simple/challenging" dropped to 4.40, which was the only other negative response. The "simple complicated" adjectives reduced to a more neutral response of 3.80.

The lowest mean on the pre-inservice survey (Table XVIII) was "fresh/stale" with a mean of 2.33. Three, "open/closed", "active/passive" and "friendly/unfriendly" shared the second lowest mean of 2.40. In Table XIX, "fresh/stale" (2.53) no longer has the low mean, but "friendly/unfriendly" has the new low mean of 1.80. "active/passive" still has the second lowest mean of 1.93 while "open/closed" increased 2.33. In the follow-up questionnaire (Table XX), "friendly/unfriendly" still has the lowest mean even though it had increased to 2.30. The second lowest mean was tied with a mean 2.40 with "masculine/feminine" and "active passive".

In Table XXI it can be seen that science teachers perceptions of agriculture are less challenging, and less complicated but more work and masculine after attending the inservice and collaborating during the school year.

TABLE XIX

PERCEPTIONS OF AGRICULTURE BY SCIENCE TEACHERS

POST-INSERVICE QUESTIONNAIRE

Bi-polar adjectives	1	2	3	4	5	6	7	Bi-Polar adjectives	Mean	Perception
Progressive	3	3	4	5				traditional	2.73	progressive
simple		1		2	8	3	1	complicated	5.00	complicated
like me	3	2	7	3				unlike me	2.67	like me
friendly	3	5	5	2				unfriendly	2.40	friendly
simple				1	6	5	3	challenging	5.67	challenging
humorous			1	5	7	1	1	serious	4.73	serious
fresh	3	7	2	3				stale	2.33	fresh
fun		3	3	3	4	2	1	work	4.40	work
relaxed		3	5	5	2			tense	3.40	relaxed
clear	2	5	5	3				confusing	2.60	clear
structure	1	6	3	5				unstructured	2.80	structured
bright	2	5	5	3				dull	2.60	bright
systematic		6	6	3				unsystematic	2.80	systematic
masculine		2	6	7				feminine	3.33	masculine
active	2	7	4	2				passive	2.40	active
accepting	1	5	7	3				rejecting	2.93	accepting
open	2	7	5		1			closed	2.40	Open
GRAND MEAN									3.25	

TABLE XX

PERCEPTIONS OF AGRICULTURE BY SCIENCE TEACHERS

FOLLOW-UP QUESTIONNAIRE

Bi-polar adjectives	1	2	3	4	5	6	7	Bi-Polar adjectives	Mean	Perception
Progressive		3	2	1				traditional	3.20	progressive
simple		1	1	1	2			complicated	3.80	simple
like me	1	2		2				unlike me	2.60	like me
friendly	1	3	1					unfriendly	2.00	friendly
simple			1	2	1	1		challenging	4.40	complicated
humorous				3		2		serious	4.80	serious
fresh			5					stale	3.00	fresh
fun			1	1	1	2		work	4.80	work
relaxed		1	1	3				tense	3.40	relaxed
clear			2	3				confusing	3.60	clear
structure		1	2	2				unstructured	3.20	structured
bright			5					dull	3.00	bright
systematic		2		2	1			unsystematic	3.40	systematic
masculine	1	2	1	1				feminine	2.40	masculine
active	1	2	1	1				passive	2.40	active
accepting		2	1	2				rejecting	3.00	accepting
open		3			1	1		closed	3.40	Open
GRAND MEAN									3.32	

TABLE XXI

SUMMARY OF MEANS OF SCIENCE TEACHERS PERCEPTIONS OF AGRICULTURE

Bi-polar adjective	Pre-inservice Mean	Post-inservice Mean	Follow-up Mean
Progressive/traditional	3.27	2.73	3.20
simple/complicated	4.93	5.00	3.80
like me/ unlike me	3.20	2.67	2.60
friendly/unfriendly	1.80	2.40	2.00
simple/challenging	5.40	5.67	4.40
humorous/serious	4.67	4.73	4.80
fresh/stale	2.53	2.33	3.00
fun/work	3.53	4.40	4.80
relaxed/tense	2.93	3.40	3.40
clear/confusing	3.07	2.60	3.60
structure/unstructured	3.40	2.80	3.20
bright/dull	2.67	2.60	3.00
systematic/unsystematic	3.00	2.80	3.40
masculine/feminine	3.07	3.33	2.40
active/passive	1.93	2.40	2.40
accepting/rejecting	2.40	2.93	3.00
open/closed	2.33	2.40	3.40

Agricultural Teachers Perceptions of Science

Objective five was to determine the perceptions of science by agriculture teachers. Like objective four, the same bi-polar adjective scale was used to determine if the perceptions had changed after attending the Summer Agriscience Inservice. The bi-polar adjective were given a value of 1 through 7 with 1 being the extreme positive and 7 being the extreme negative.

Table XXII shows the highest mean of 5.45 on "simple/challenging" on the pre-inservice questionnaire. The second lowest mean was "humorous/serious" with a score of 5.00. The "simple/complicated" and "masculine/feminine" means were the only other negative means with scores of scores of 4.27 and 4.00 respectively. On the post-inservice questionnaire (Table XXIII), "simple/challenging" still had the highest mean at 5.06. The "humorous/serious" mean dropped to 4.24 along with the "masculine/feminine" which dropped to 3.24. The "simple/complicated" mean increased to 4.53. On the follow-up questionnaire (Table XXIV), "simple/challenging" still had the high mean, which increased, of 5.47. That score was tied with "friendly/unfriendly" and those were the only two negative scores reported on that questionnaire.

The lowest mean on the pre-inservice survey (Table XXII) was the "open/closed" mean of 2.47. The "bright/dull" mean was the second lowest with a score of 2.76. In Table XXIII, the lowest means on the post-inservice questionnaire was still "open/closed" with a mean of 2.00. The second lowest mean changed and was tied by "friendly/unfriendly" and "accepting/unaccepting" with a mean of 2.27.

Table shows that agriculture teachers' perceptions about science became more friendly, challenging and open after attending the inservice and collaborating.

TABLE XXII

PERCEPTIONS OF SCIENCE BY AGRICULTURE TEACHERS

PRE-INSERVICE QUESTIONNAIRE

Bi-polar adjectives	1	2	3	4	5	6	7	Bi-Polar adjectives	Mean	Perception
Progressive	1	5	9	1	1			traditional	2.76	progressive
simple		2	7	5	1	1		complicated	3.29	simple
like me		6	4	7				unlike me	3.06	like me
friendly				1	9	5	2	unfriendly	5.47	unfriendly
simple				1	9	5	2	challenging	5.47	challenging
humorous		1	2	3	6	4	1	serious	4.76	serious
fresh		7	6	3		1		stale	2.94	fresh
fun		6	1	7	3			work	3.41	fun
relaxed	1	4	4	7		1		tense	3.24	relaxed
clear	1	4	1	6	3	2		confusing	3.71	clear
structure	1	8	2	5	1			unstructured	2.82	structured
bright		7	11					dull	2.76	bright
systematic		6	9	3				unsystematic	3.00	systematic
masculine		4	5	9				feminine	3.47	masculine
active	2	4	7	5				passive	3.00	active
accepting	3	3	9	3				rejecting	2.82	accepting
open	5	5	6	1	1			closed	2.47	Open
GRAND MEAN									3.44	

TABLE XXIII

PERCEPTIONS OF SCIENCE BY AGRICULTURE TEACHERS

POST-INSERVICE QUESTIONNAIRE

Bi-polar adjectives	1	2	3	4	5	6	7	Bi-Polar adjectives	Mean	Perception
Progressive	2	6	5		3			traditional	2.59	progressive
simple			4	4	5	4		complicated	4.53	complicated
like me	1	6	6	3	1			unlike me	2.82	like me
friendly	1	7	6	3				unfriendly	2.65	friendly
simple			2	2	6	7		challenging	5.06	challenging
humorous			7	1	7	2		serious	4.24	serious
fresh	1	8	5	1	2			stale	2.71	fresh
fun		5	2	9	1			work	3.35	fun
relaxed			10	7				tense	3.41	relaxed
clear	1	2	8	6				confusing	3.12	clear
structure	2	6	5	1	3			unstructured	2.82	structured
bright	2	6	10	1				dull	2.82	bright
systematic	1	3	8	5				unsystematic	3.00	systematic
masculine	1	2	6	8				feminine	3.24	masculine
active	4	2	8	3				passive	2.59	active
accepting	2	7	8					rejecting	2.35	accepting
open	6	6	3	2				closed	2.06	Open
GRAND MEAN									3.14	

TABLE XIV

PERCEPTIONS OF SCIENCE BY AGRICULTURE TEACHERS

FOLLOW-UP QUESTIONNAIRE

Bi-polar adjectives	1	2	3	4	5	6	7	Bi-Polar	Mean	Perception
Progressive	3	2	4	3				traditional	2.58	progressive
simple		1	2	5	3		1	complicated	4.17	complicated
like me	4	4	2	1	1			unlike me	2.25	like me
friendly	3	4	5					unfriendly	2.17	friendly
simple				4	2	1	5	challenging	5.58	challenging
humorous			1	2	7	1	1	serious	4.92	serious
fresh	4	2	4	2				stale	2.33	fresh
fun	2	3	3	3		1		work	2.92	fun
relaxed	1	2	3	6				tense	3.17	relaxed
clear	1	3	6	1	1			confusing	2.83	clear
structure	3	2	4	3				unstructured	2.58	structured
bright	2	5	3	2				dull	2.42	bright
systematic	1	3	7	1				unsystematic	2.67	systematic
masculine		1	1	7	3			feminine	4.00	neutral
active	2	7	2	1				passive	2.17	active
accepting	2	5	3	2				rejecting	2.42	accepting
open	4	5	3					closed	1.92	Open
GRAND MEAN									3.00	

TABLE XV

SUMMARY OF MEANS OF AGRICULTURE TEACHERS PERCEPTIONS OF SCIENCE

Bi-polar adjective	Pre-inservice Mean	Post-inservice Mean	Follow-up Mean
Progressive/traditional	2.76	2.59	2.58
simple/complicated	3.29	4.53	4.17
like me/ unlike me	3.06	2.82	2.25
friendly/unfriendly	5.47	2.65	2.17
simple/challenging	5.47	5.06	5.58
humorous/serious	4.76	4.24	4.92
fresh/stale	2.94	2.71	2.33
fun/work	3.41	3.35	2.92
relaxed/tense	3.24	3.41	3.17
clear/confusing	3.71	3.12	2.83
structure/unstructured	2.82	2.82	2.38
bright/dull	2.76	2.82	2.42
systematic/unsystematic	3.00	3.00	2.67
masculine/feminine	3.47	3.24	4.00
active/passive	3.00	2.59	2.17
accepting/rejecting	2.82	2.35	2.42
open/closed	2.47	2.06	1.92

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to examine collaboration activities between secondary agricultural and science teachers before and after attending the Oklahoma Agriscience Summer Inservice. The objectives of the study were the following:

1. Describe the demographic characteristics of the participants of the Oklahoma Summer Agriscience Inservice.

2. Determine the impact of the Oklahoma Agriscience Summer Inservice on collaboration efforts between secondary agricultural and science teachers.

3. Identify barriers existed that prevented secondary science and agricultural teachers from collaborating.

4. Describe secondary science teachers' perceptions regarding agriculture.

5. Describe secondary agriculture teachers' perceptions regarding science.

Conclusions

Conclusions Relating to Objective 1

TABLE XXVI

Participant Characteristic	Finding
Gender	Male 81.3%
Average Teaching Experience	12.6 years
Average Time at Teaching Assignment	9.4 years
Average High School Enrollment	300-235 (A)
Most Common Class Taught by Agriculture Teacher	Agscience II
Most Common Class Taught by Agriculture Teacher	Biology

1. The typical participant was male with an average of 12.6 years of teaching experience. The average years at current teaching assignment were 9.4 years.

2. The average size school enrollment of the participants was A classification.

3. There were a wide variety of classes taught by the teachers. Agscience II was the most common for agriculture teachers while biology was the most common in science teachers.

Conclusions Relating to Objective 2

1. The majority of both agriculture and science teachers took the inservice to learn more about agriscience and get new ideas for the classroom.

2. Collaboration increased substantially after attending the Oklahoma Summer Agriscience Inservice with resource sharing being the most common form of collaboration. Collaboration took place most frequently in Natural Resources and Bio-

4. More agriculture teachers than science teachers collaborate with other faculty. The majority of collaborative activities were being with the math or English teacher.

5. A high majority indicated that the inservice increased collaboration and the response to the inservice was very positive.

Conclusions Relating to Objective 3

Time and scheduling constraints is what hindered collaboration or the extent of collaboration that took place in all instances..

Conclusion Relating to Objective 4

1. Science teachers tended to see agriculture as being serious, challenging, complicated and work. The also indicated it to be open, fresh, friendly, active and masculine.

2. The inservice resulted in a change in science teachers' perceptions about agriculture in that they found it to be less complicated and challenging while more work and masculine.

Conclusions Relating to Objective 5

1. Agriculture teachers tended to see science as challenging, serious, complicated and feminine. The also distinguish science as an open, bright, friendly, and accepting discipline. The science teachers perceptions of agriculture are positive.

2. The inservice resulted in a change in agriculture teachers' perceptions of science that they found it to more friendly, challenging and open. The agricultural teachers perceptions of science are positive.

Recommendations

1. Based upon the teachers' comments, the inservice should provide more hands-on activities for teachers.

2. Future inservices should demonstrate how the material presented in the inservice relates to the teachers' current curriculum at the inservice.

3. Future inservices should show teachers creative ways to work around time conflicts in the inservice.

4. Future inservices should show more of how agriculture relates to science rather than how science is in agriculture in order to attract and get better response rate from science teachers.

Recommendations for Additional Research

1. A long term follow-up study should be conducted on program participants to see if collaboration continues to increase.

2. Studies of what specific classroom unit objectives that are being taught through collaborative activities should be conducted.

3. A comparison study of student scores compared to those students who do not participate in collaborative classroom situations should be conducted.

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APPENDIX A
PRE-INSERVICE QUESTIONAIRRE AGRICULTURE TEACHER

Agriscience Summer Institute
Pre-Evaluation Survey

NOTE: Information collected will be reported in group data only, your name will not be identified with the response given here.

by: Joelle Moman
OSU AgEd

1. How long have you been teaching at the secondary level?

2. How long have you been at your current school?

3. What is your high school's total enrollment or classification (A, 2A, etc..)?

4. What is your gender: _____ Male _____ Female

5. Are you currently or have you been involved in any collaboration efforts with the science teacher?

_____ Yes _____ No

6. If yes, briefly describe.

7. Have you conducted any other joint projects with other teachers in your school? _____ Yes _____ No

8. If yes, briefly describe.

9. Why did you enroll for this workshop?

10. What are your expectations for attending this workshop?

11. Below, describe you how feel about science by placing a check in one of the seven spaces between each word pair:

traditional	___	___	___	___	___	___	___	progressive
simple	___	___	___	___	___	___	___	complicated
like me	___	___	___	___	___	___	___	unlike me
friendly	___	___	___	___	___	___	___	unfriendly
challenging	___	___	___	___	___	___	___	simple
serious	___	___	___	___	___	___	___	humorous
stale	___	___	___	___	___	___	___	fresh
work	___	___	___	___	___	___	___	fun
relaxed	___	___	___	___	___	___	___	tense
clear	___	___	___	___	___	___	___	confusing
unstructured	___	___	___	___	___	___	___	structured
bright	___	___	___	___	___	___	___	dull
systematic	___	___	___	___	___	___	___	unsystematic
masculine	___	___	___	___	___	___	___	feminine
active	___	___	___	___	___	___	___	passive
accepting	___	___	___	___	___	___	___	rejecting
closed	___	___	___	___	___	___	___	open

THANK YOU!!

APPENDIX B
PRE-INSERVICE QUESTIONAIRRE SCIENCE TEACHER

Agriscience Summer Institute
Pre-Evaluation Survey

NOTE: Information collected will be reported in group data only, your name will not be identified with the response given here.

by: Joelle Moman
OSU AgEd

1. How long have you been teaching at the secondary level?

2. How long have you been at your current school?

3. What is your high school's total enrollment or classification (A, 2A, etc..)?

4. What is your gender: _____ Male _____ Female

5. Are you currently or have you been involved in any collaboration efforts with the agriculture teacher?

_____ Yes _____ No

6. If yes, briefly describe.

7. Have you conducted any other joint projects with other teachers in your school? _____ Yes _____ No

8. If yes, briefly describe.

9. Why did you enroll for this workshop?

10. What are your expectations for attending this workshop?

11. Below, describe you how feel about agriculture by placing a check in one of the seven spaces between each word pair:

traditional	___ ___ ___ ___ ___ ___ ___	progressive
simple	___ ___ ___ ___ ___ ___ ___	complicated
like me	___ ___ ___ ___ ___ ___ ___	unlike me
friendly	___ ___ ___ ___ ___ ___ ___	unfriendly
challenging	___ ___ ___ ___ ___ ___ ___	simple
serious	___ ___ ___ ___ ___ ___ ___	humorous
stale	___ ___ ___ ___ ___ ___ ___	fresh
work	___ ___ ___ ___ ___ ___ ___	fun
relaxed	___ ___ ___ ___ ___ ___ ___	tense
clear	___ ___ ___ ___ ___ ___ ___	confusing
unstructured	___ ___ ___ ___ ___ ___ ___	structured
bright	___ ___ ___ ___ ___ ___ ___	dull
systematic	___ ___ ___ ___ ___ ___ ___	unsystematic
masculine	___ ___ ___ ___ ___ ___ ___	feminine
active	___ ___ ___ ___ ___ ___ ___	passive
accepting	___ ___ ___ ___ ___ ___ ___	rejecting
closed	___ ___ ___ ___ ___ ___ ___	open

THANK YOU!!

APPENDIX C
POST-INSERVICE QUESTIONAIRRE AGRICULTURE TEACHER

Agriscience Summer Institute
PostEvaluation Survey

NOTE: Information collected will be reported in group data only, your name will not be identified with the response given here.

by: Joelle Moman
OSU AgEd

1. Did the workshop provide you with the tools to further collaborate?
Please explain.

2. What are your future plans for collaboration?

3. What else do you need to help you intiate further collaboration efforts?

4. How do you feel your students will benefit from collaboration?

5.Any further comments?

further questions on the back =>

4. How do you feel your students will benefit from collaboration?

5.Any further comments?

further questions on the back =>

6. Below, describe you how feel about science by placing a check in one of the seven spaces between each word pair:

traditional	___	___	___	___	___	___	___	progressive
simple	___	___	___	___	___	___	___	complicated
like me	___	___	___	___	___	___	___	unlike me
friendly	___	___	___	___	___	___	___	unfriendly
challenging	___	___	___	___	___	___	___	simple
serious	___	___	___	___	___	___	___	humorous
stale	___	___	___	___	___	___	___	fresh
work	___	___	___	___	___	___	___	fun
relaxed	___	___	___	___	___	___	___	tense
clear	___	___	___	___	___	___	___	confusing
unstructured	___	___	___	___	___	___	___	structured
bright	___	___	___	___	___	___	___	dull
systematic	___	___	___	___	___	___	___	unsystematic
masculine	___	___	___	___	___	___	___	feminine
active	___	___	___	___	___	___	___	passive
accepting	___	___	___	___	___	___	___	rejecting
closed	___	___	___	___	___	___	___	open

THANK YOU!!

APPENDIX D

POST-INSERVICE QUESTIONAIRRE SCIENCE TEACHER

Agriscience Summer Institute
PostEvaluation Survey

NOTE: **Information collected will be reported in group data only, your name will not be identified with the response given here.**

by: Joelle Moman
OSU AgEd

1. Did the workshop provide you with the tools to further collaborate?
Please explain.

2. What are your future plans for collaboration?

3. What else do you need to help you intiate further collaboration efforts?

4. How do you feel your students will benefit from collaboration?

5. Any further comments?

further questions on the back =>

6. Below, describe you how feel about agriculture by placing a check in one of the seven spaces between each word pair:

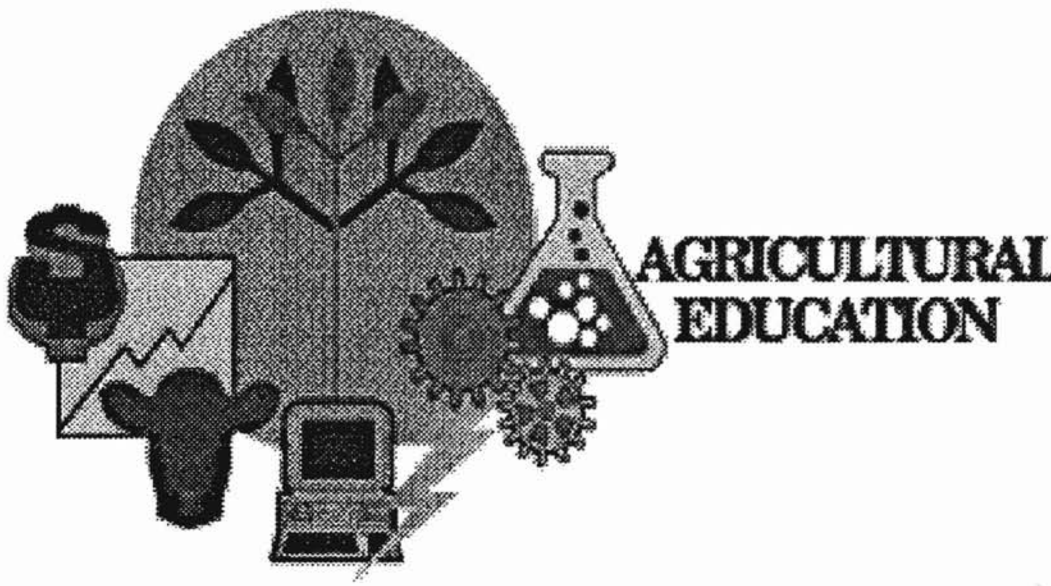
traditional	___ ___ ___ ___ ___ ___ ___	progressive
simple	___ ___ ___ ___ ___ ___ ___	complicated
like me	___ ___ ___ ___ ___ ___ ___	unlike me
friendly	___ ___ ___ ___ ___ ___ ___	unfriendly
challenging	___ ___ ___ ___ ___ ___ ___	simple
serious	___ ___ ___ ___ ___ ___ ___	humorous
stale	___ ___ ___ ___ ___ ___ ___	fresh
work	___ ___ ___ ___ ___ ___ ___	fun
relaxed	___ ___ ___ ___ ___ ___ ___	tense
clear	___ ___ ___ ___ ___ ___ ___	confusing
unstructured	___ ___ ___ ___ ___ ___ ___	structured
bright	___ ___ ___ ___ ___ ___ ___	dull
systematic	___ ___ ___ ___ ___ ___ ___	unsystematic
masculine	___ ___ ___ ___ ___ ___ ___	feminine
active	___ ___ ___ ___ ___ ___ ___	passive
accepting	___ ___ ___ ___ ___ ___ ___	rejecting
closed	___ ___ ___ ___ ___ ___ ___	open

THANK YOU!!

APPENDIX E

FOLLOW-UP QUESTIONAIRRE, AGRICULTURE TEACHER

1997
Agriscience Summer Workshop



Follow-up Questionnaire

Return to:
Joelle Moman
Dept. of Ag Ed, Com, & 4-H
Oklahoma State University
448 Ag Hall
Stillwater, OK 74078

Please answer the following questions.

1. Have you participated in any collaboration activities together with the agricultural teacher during the 1997-98 school year?

_____ **YES**, I collaborated with the agricultural education teacher.

a) what type of collaboration took place? (Check all that apply)

_____ Team teaching
_____ Resource sharing
_____ Joint student projects
_____ Other ______________________________

b) In which classes did you collaborate?

c) Please describe the collaborative activities.

d) What were some of the barriers that you came across in collaboration?

_____ NO, I did not collaborate with the agricultural education teacher.

a) What prevented you from collaborating?

2. What classes do you currently teach?

3. Did the summer agriscience workshop help increase collaborative activities?

_____ **YES**, the workshop increased collaboration.

a) How did the workshop increase collaboration?

_____ **NO**, the workshop did not help increase collaboration.

a) What could the workshop provided you that would have enabled you to collaborate?

4. What was your student's response to your collaboration?

5. How could the agriscience workshop be better?

6. What is your general opinion of the Summer Agriscience Workshop?

7. Below, describe how you feel about science by placing a check in one of the seven spaces between each word pair:

traditional	___ ___ ___ ___ ___ ___ ___	progressive
simple	___ ___ ___ ___ ___ ___ ___	complicated
like me	___ ___ ___ ___ ___ ___ ___	unlike me
friendly	___ ___ ___ ___ ___ ___ ___	unfriendly
challenging	___ ___ ___ ___ ___ ___ ___	simple
serious	___ ___ ___ ___ ___ ___ ___	humorous
stale	___ ___ ___ ___ ___ ___ ___	fresh
work	___ ___ ___ ___ ___ ___ ___	fun
relaxed	___ ___ ___ ___ ___ ___ ___	tense
clear	___ ___ ___ ___ ___ ___ ___	confusing
unstructured	___ ___ ___ ___ ___ ___ ___	structured
bright	___ ___ ___ ___ ___ ___ ___	dull
systematic	___ ___ ___ ___ ___ ___ ___	unsystematic
masculine	___ ___ ___ ___ ___ ___ ___	feminine
active	___ ___ ___ ___ ___ ___ ___	passive
accepting	___ ___ ___ ___ ___ ___ ___	rejecting
closed	___ ___ ___ ___ ___ ___ ___	open

THANK YOU!!

APPENDIX F
FOLLOW-UP QUESTIONAIRRE, SCIENCE TEACHER

1997
Agriscience Summer Workshop

AGRICULTURAL EDUCATION

Follow-up Questionnaire

Return to:
Joelle Moman
Dept. of Ag Ed, Com, & 4-H
Oklahoma State University
448 Ag Hall
Stillwater, OK 74078

Please answer the following questions.

1. Have you participated in any collaboration activities together with the science teacher during the 1997-98 school year?

_____ **YES**, I collaborated with the science education teacher.

a) what type of collaboration took place? (Check all that apply)

_____ Team teaching
_____ Resource sharing
_____ Joint student projects
_____ Other ______________________________

b) In which classes did you collaborate?

c) Please describe the collaborative activities.

d) What were some of the barriers that you came across in collaboration?

_____ **NO**, I did not collaborate with the science education teacher.

a) What prevented you from collaborating?

2. What classes do you currently teach?

3. Did the summer agriscience workshop help increase collaborative activities?

_____ **YES**, the workshop increased collaboration.

a) How did the workshop increase collaboration?

_____ **NO**, the workshop did not help increase collaboration.

a) What could the workshop provided you that would have enabled you to collaborate?

4. What was your student's response to your collaboration?

5. How could the agriscience workshop be better?

6. What is your general opinion of the Summer Agriscience Workshop?

7. Below, describe how you feel about science by placing a check in one of the seven spaces between each word pair:

traditional	___ ___ ___ ___ ___ ___ ___	progressive
simple	___ ___ ___ ___ ___ ___ ___	complicated
like me	___ ___ ___ ___ ___ ___ ___	unlike me
friendly	___ ___ ___ ___ ___ ___ ___	unfriendly
challenging	___ ___ ___ ___ ___ ___ ___	simple
serious	___ ___ ___ ___ ___ ___ ___	humorous
stale	___ ___ ___ ___ ___ ___ ___	fresh
work	___ ___ ___ ___ ___ ___ ___	fun
relaxed	___ ___ ___ ___ ___ ___ ___	tense
clear	___ ___ ___ ___ ___ ___ ___	confusing
unstructured	___ ___ ___ ___ ___ ___ ___	structured
bright	___ ___ ___ ___ ___ ___ ___	dull
systematic	___ ___ ___ ___ ___ ___ ___	unsystematic
masculine	___ ___ ___ ___ ___ ___ ___	feminine
active	___ ___ ___ ___ ___ ___ ___	passive
accepting	___ ___ ___ ___ ___ ___ ___	rejecting
closed	___ ___ ___ ___ ___ ___ ___	open

THANK YOU!!

APPENDIX G
COVER LETTER

February 5, 1998

Dear

We appreciate your willingness to take a few minutes of your time to provide some information based upon the instruction you received last June at the Agriscience Summer Inservice. The enclosed questionnaire will help improve the effectiveness of future agriscience inservices.

The information you provide on this mail survey will be kept strictly confidential. A coding system will be used for follow-up purposes only and will be used only by the researchers. The information will be reported in the aggregate with no identification of your program or you in the thesis which will be a result of this study. If you have any questions concerning this research, you may contact any of the researchers at the above address or phone, or Gay Clarkson, the Oklahoma State University Institutional Review Board Executive Secretary at 305 Whitehurst, OSU, Stillwater, OK 74074, ph. (405) 744-5700.

Again, thank you for taking the time to provide information which will be very valuable for planning future inservices.

Sincerely,

Joelle Moman	Bill Weeks	Eddie Smith
Graduate Student	Advisor	State Program Administrator
Agricultural Education	Agricultural Education	Agricultural Education

APPENDIX H
COVER LETTER, SECOND MAILING

February 27, 1998

«First_Name» «Last_Name»
«School»
«Address»
«City», «State» «Zip»

Dear «First_Name»,

This is just a reminder that we have not received your response to the Agriscience workshop follow-up questionnaire. An additional questionnaire has been included in the event that yours was lost. Even if you did not utilize the information presented at the workshop or you have not participated in any collaborative activities, please return the questionnaire indicating such. If you have already returned your response, please disregard this notice.

Remember, the information you provide on this mail survey will be kept strictly confidential. A coding system will be used for follow-up purposes only and will be used only by the researchers. The information will be reported in the aggregate with no identification of your program or you in the thesis which will be a result of this study. If you have any questions concerning this research, you may contact any of the researchers at the above address or phone, or Gay Clarkson, the Oklahoma State University Institutional Review Board Executive Secretary at 305 Whitehurst, OSU, Stillwater, OK 74074, ph. (405) 744-5700.

Thank you,

Joelle Moman
Graduate Student
Dept. of Ag Ed, Comm, & 4-H
Oklahoma State University

APPENDIX I
IRB FORM

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: February 18, 1998 **IRB #: AG-98-027**

Proposal Title: AN ASSESSMENT OF COLLABORATION EFFORTS BETWEEN SECONDARY AGRICULTURAL AND SCIENCE TEACHERS PRIOR TO AND AFTER ATTENDING THE OKLAHOMA AGRISCIENCE SUMMER INSTITUTE

Principal Investigator(s): William G. Weeks, Joelle Katz Moman

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:

Signature: John H. Wychoff

Chair of Institutional Review Board

Date: February 20, 1998

cc: Joelle Katz Moman

2

VITA

Joelle Katz Moman

Candidate for the Degree of

Master of Science

Thesis: AN ASSESSMENT OF COLLABORATION EFFORTS BETWEEN TEACHERS ATTENDING THE OKLAHOMA AGRISCIENCE SUMMER INSERVICE

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Tucson, Arizona on November 19, 1971 , the daughter of Mr. Barry Katz and Mrs. Jean Waters.

Education: Graduated from Flowing Wells High School, Tucson Arizona in May, 1989;
Bachelor of Science degree in Agricultural Education from University of Arizona, May 1994;
Completed the requirements for the Master of Science degree at Oklahoma State University, May, 1998.

Professional Experience: Agricultural Education Instructor, Rifle High School, Rifle, Colorado (1994-1996), Graduate Teaching Assistant, Department of Biosystems and Agricultural Engineering, Oklahoma State University, Stillwater, Oklahoma (1996-1998).

Professional Memberships: Phi Delta Kappa, American Association of Agricultural Educators, Alpha Tau Alpha. American and Oklahoma Vocational Association.