To the Graduate Council:

I am submitting herewith a dissertation written by Robert A. Core entitled "An Investigation of the Effect of Cooperative Learning on Attitude Toward In-Service Programs for Biology and Chemistry Teachers in Knox County, Tennessee." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

A. Paul Wishart

A. Paul Wishart, Major Professor

We have read this dissertation
and recommend its acceptance:

James D. Caponetti

Robert K. Roney

Willie D. Dawson

Accepted for the Council:

Carolyn Winkel

Associate Vice Chancellor
and Dean of The Graduate School

AN INVESTIGATION OF THE EFFECT OF COOPERATIVE LEARNING ON ATTITUDE TOWARD IN-SERVICE PROGRAMS FOR BIOLOGY AND CHEMISTRY TEACHERS IN KNOX COUNTY, TENNESSEE

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Robert A. Core

August 1991

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation to his family for their encouragement during the pursual of this degree. He would especially like to acknowledge his wife Sylvia, her father Dr. K. Deane Stout, his son Andrew, and his parents, Dr. Harold A. and Mrs. Geraldine H. Core, for their continued love and support.

Special thanks is given to the administration and the biology and chemistry teachers of the Knox County School System. The study upon which this dissertation is based would not have been possible without their cooperation.

Gratitude is given to Dr. Jill D. Wright and Ms. Audrey J. Williams for their help in this project.

Appreciation is also extended to the graduate committee members, Dr. A. Paul Wishart, chairman, Dr. James D. Caponetti, Dr. Robert K. Roney, and Dr. Wilber S. Slawson. A special acknowledgment goes to Dr. A. Paul Wishart for his assistance and guidance through both the Master's and Doctoral degrees.

ABSTRACT

The purpose of this study was to develop a cooperative learning in-service program and determine its effectiveness in promoting a positive gain in attitude toward in-service programs. Hypotheses were formulated and tested.

There were two distinct populations for the study: All the biology teachers and all the chemistry teachers from the Knox County School System in Tennessee. All teachers were given a pre-treatment survey in order to obtain baseline data. Participation in the cooperative learning in-service programs was voluntary. Participants and non-participants were compared to each other and to the baseline data for the combined and individual populations. Teaching experience was also examined as a possible factor for positive attitude gain.

Data for the study were gathered by the use of an adaptation of Jensen's Teacher In-Service Education Inventory, which served as the pre/post-treatment survey instrument. The data were tabulated and analyzed through the use of the SAS computer program. The primary analyses techniques used were means and standard deviations. An open-ended question on the survey allowed for expression of opinion.

Analysis of the pre/post-treatment results indicated that the use of a cooperative learning in-service program resulted in positive gains in attitude toward in-service for the participants of both populations of biology and

chemistry teachers. Post-treatment comparisons between participants and non-participants demonstrated that a more positive attitude was achieved by the participants in each discipline and combination of disciplines. Teaching experience was not a determining factor in gain of positive attitude for either population.

TABLE OF CONTENTS

CHAPTER PAGE

LIST OF TABLES

LIST OF FIGURES

FIGURE PAGE

CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

The reform movements of the early 1980s were direct responses to the growing perception that students were not reaching educational goals, especially in science and mathematics. Researchers predict that this shortfall will result in a generation of scientific illiterates who will not be able to compete in the increasingly technology oriented world in which they will live. The National Assessment of Educational Progress in The Science Report Card as cited in the Alliance for Undergraduate Education (1991) concluded that "our nation is producing . . . students who lack the intellectual skills necessary to assess the validity of evidence or the logic of arguments, and who are misinformed about the nature of scientific endeavors" (p. 37). In international comparisons, the United States does not fare well. In a multi-nation study by the International Association for the Evaluation of Educational Achievement as cited in the Alliance for Undergraduate Education (1991), students from the United States were fourteenth out of fourteen countries in high school biology achievement. The same study ranked U.S. students twelfth in high school chemistry and ninth in physics.

In April of 1983, the National Commission on Excellence in Education (NCEE) initiated the reform movement with A Nation at Risk. This report called

for curricular changes and stronger credentials for potential science teachers. The study provided recommendations in five areas: content, standards and expectations, time, teaching, and leadership and fiscal support. Higher expectations from students, teachers, administrators and citizens were stressed in each section. This ground-breaking study provided direction for the many reform documents to follow.

Study after study provided many innovative ideas to improve student achievement. Curricular changes, cooperative learning, improved instructional techniques, increased requirements for prospective teachers, and alternative licensing were all discussed by reform leaders. Science for All Americans: Project 2061 (American Association for the Advancement of Science, 1989), Turning Points (Carnegie Council for Adolescent Development, cited in the Alliance for Undergraduate Education, 1991), and Educating Americans for the 21st Century (National Science Board, 1983) are all examples of the studies that were charged with the task of proposing methods for reversing the negative trend in student achievement. That the problem of science illiteracy exists cannot be debated. How to specifically implement the innovations, especially at the local level, is overlooked in these national studies.

Teachers are the instruments of change for student behaviors. Teacher training is vital to accomplish the objectives of the reform movement. Pre-service teachers can certainly benefit from increased requirements and standards for certification as well as receive information about new theories of instruction. The Holmes Group (1986) in Tomorrow's Teachers recognizes

this as a primary goal of teacher education reform. Once in the classroom, however, unless a teacher returns to work toward advanced degrees, professional growth is often restricted to in-service opportunities provided by the local school system. Ideally, in-service education can result in the improvement-of-practice that the blue ribbon commissions of the 1980s claim is needed. Improvement-of-practice entails "teaching that challenges students more than our current methods do, that expects more of students, that demands higher-order thinking from them, that prepares them for the workplace of tomorrow" (Kennedy, 1991, p. 661). These national commissions, though, neglect a specific plan for in-service training.

An in-service program that treats teachers as professionals, diminishes isolation, provides new, practical ideas for the classroom, is discipline specific, promotes a collegial atmosphere, and expects them to be active participants in their career development can accomplish this improvement-of-practice. It then becomes the challenge of the local administration to provide innovation in their in-service plans in order for the broad sweeping changes to be made. In-service programs directed toward science teachers have traditionally been "one-shot" affairs, held at the beginning of the school term, with the hope of having some lasting effect on staff development. Unfortunately, positive teacher attitudes toward in-service programs and their value to the teaching profession are often lacking (Lawrence, 1974). Typically, these events have taken the form of "dog and pony" shows. Some charismatic speakers are received enthusiastically, but quickly forgotten. Visiting experts are often

resented and turned off immediately by the very ones they are supposed to be reaching. There exists no real opportunity for a change in attitude. Only over time can changes in attitude be affected, and one 3-hour session per year has little chance of accomplishing this (Joyce & Showers, 1988).

The Oak Ridge, Tennessee, School System has for many years set aside 3 hours of in-service time every Wednesday afternoon for each school within the system. A personal visit to Oak Ridge High School in the Spring of 1990 permitted the researcher to observe the science faculty participating in a variety of in-service activities.

Problem Area

The profession of teaching can be a very lonely profession (Rodriguez & Johnstone, 1985). A teacher is expected to implement a curriculum of study largely through his/her own efforts within the confines of a classroom. Little contact with colleagues teaching the same subject material is possible, except at annual, usually large-group in-service meetings. The result is isolation, and the teacher's limited experiences become the measuring stick for success or failure. Occasional visits and evaluations by administrators do occur but are often viewed as threats rather than as opportunities for growth. The problem area to be investigated is to generate a positive attitude toward in-service programs of Knox County biology and chemistry teachers by developing a collegial, cooperative learning in-service program.

Problem Statement

The purpose of this study is to investigate the effect of cooperative learning on attitude toward in-service programs for biology and chemistry teachers in Knox County, Tennessee.

Hypotheses

The following hypotheses will give direction to the study:

H_1--Biology and chemistry teachers as a group who participate in the cooperative learning in-service program will show a gain in positive attitude toward in-service programs.

H_2--Biology teachers who participate in the cooperative learning in-service program will show a gain in positive attitude toward in-service programs.

H_3--Chemistry teachers who participate in the cooperative learning in-service program will show a gain in positive attitude toward in-service programs.

H_4--Biology teachers with 10 years or less experience who participate in the program will show a greater gain in positive attitude toward in-service programs than biology teachers with more than 10 years experience who participate in the program.

H_5--Chemistry teachers with 10 years or less experience who participate in the program will show a greater gain in positive attitude toward in-service programs than chemistry teachers with more than 10 years experience who participate in the program.

Definition of Terms

The following terms will be defined operationally for this study:

Attitude - A reaction that is specific to a given subject that is accompanied by emotions and feelings.

Cooperative learning - Changes in behavior resulting wholly or in part from shared experiences of two or more persons.

In-service programs - School or system training plans that may include such activities as seminars or workshops for individuals already teaching; the programs are designed to increase their competency or to bring them abreast of new developments.

Non-participant - A biology or chemistry teacher who did not attend any of the three offered cooperative learning in-service programs.

Participant - A biology or chemistry teacher who attended at least one of the three offered cooperative learning in-service programs.

Participate - In attendance in at least one of the three cooperative in-service meetings held over the period of 1 calendar year.

Assumptions of the Study

In order to conduct this study, the following assumptions were made:

1. Teachers will have the option of choosing to participate in the in-service program.
2. The in-service program will be conducted in a non-threatening, non-evaluative manner.

3. During the in-service program, ideas will be freely exchanged, preferably in an informal, cooperative learning manner.
4. The Knox County School System will not change the basic form of in-service for biology and chemistry teachers for the time of the study.
5. Teachers will follow directions in completing the pre/post-treatment surveys.

Significance of the Study

In-service programs are ostensibly designed to promote staff development in both teaching skills and knowledge bases. A poor attitude toward an in-service program will prevent any such development from occurring. An informal cooperative learning environment can overcome this negative attitude and accomplish the goals of in-service by providing experts whom teachers can trust, communicate with easily, and know exactly what they are facing (Bloom, 1987). The formation of a collegial support group will also aid in the development of a professional identity, which is often stifled in the isolation of the classroom. New and old techniques, theories, ideas, and common problems, relative to classroom instruction, can be presented in a challenging yet non-threatening manner. The end result of positive attitude changes toward in-service will be enhanced student achievement. The expertise of Knox County biology and chemistry teachers will be shared among the people who will use it to the best advantage of the students.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The body of research literature regarding the theory of cooperative learning has grown quickly in popularity in the last 25 years. Much of the research has been directed toward the cooperative learning of students instead of teachers, however. Where teachers are mentioned, the term more likely used is "peer coaching" or "peer teaching." The value of cooperative learning among peers is becoming increasingly recognized as a viable method for promoting positive changes in attitudes and behaviors. As the National Clearinghouse for Bilingual Education (NCBE) notes, "[e]xcitement has struck the field of teacher training. New approaches . . . that utilize cooperative training processes are being tried in school districts across the country" (NCBE, 1987, p. 8). This review will be divided along five major headings: Rationale for In-service Teacher Education, Types of In-service, Teacher Attitudes Towards In-service Programs, Peer Teaching/Peer Learning for In-service Teachers, and Benefits of Cooperative Learning In-service Training.

Review of Related Literature

Rationale for In-Service Teacher Education. The educational system of the United States has come under increasingly strong demands from the

American public to stay globally competitive, especially in science and technology. Publications such as A Nation at Risk (NCEE, 1983), Action for Excellence (Education Committee of the States, 1983), and A Place Called School (Goodlad, 1984) point toward the necessity for reform and change. A Nation at Risk clearly states this concern:

> Our Nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world. . . . The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people (NCEE, 1983, p. 5).

Since the expressed purpose of in-service is to promote staff development and ultimately student achievement, in-service can provide a vehicle for much of the change necessary for currently employed teachers. American teachers as a group average 40 to 50 years of age and are in ever-increasing need of updated skills (Spector, 1987; Evans, 1987). David Champagne (1980) lists several reasons for having a well designed staff development program. These include: staff development is an effective means to provide encouragement and support for the difficult job of teaching; appropriate ways of interacting with students can be modeled in the ways staff interact with each other; regular staff development and supervision assist teachers in identifying problems and needs of a school; training provides the availability to new ideas, methodology, and resources; and curricular changes can be planned formally for better and more thorough implementation. School

staff must have access to continuing learning opportunities and ongoing professional development in order to adapt to the onslaught of social and technological change to which they are constantly subjected (New York State School Board Association, 1988). Evans (1987) consolidates the view of many by stating that "inservice teacher education is seen as an important and necessary factor for improving teaching and learning" (p. 13).

Types of In-Service Teacher Education

Staff development through in-service teacher education can mean different things to different people. In-service teacher education necessarily implies post-baccalaureate activities directed toward employed teachers only. In general, these activities include a myriad of programs such as post-graduate courses taken for increased pay status and/or certification, national and regional professional conventions, collaborative efforts between universities and school systems, state level programs, and activities planned by the local school system. For the purposes of this study, in-service teacher education will consist of those programs directed and supported by the local school system for biology and chemistry teachers. System in-service can subsume other kinds of programs, depending upon available funds. Within this system in-service, two distinct forms emerge: those initiated by administration (top-down) and those initiated from teachers themselves (bottom-up). For example, when the administration is faced with the implementation of a state mandated curriculum, pressure is applied to develop the curriculum in a top-down

manner. Frequently, workshops are used. These are typically "one-shot" efforts directed at a large group of teachers at the beginning of the school year. Curriculum leaders of the school system choose a topic of importance and invite an expert to address the teachers. These experts can include university professors, or consultants from research centers or private educational agencies. They can be anyone deemed to have the expertise necessary to improve the curriculum through professional development (Schubert, 1986). Such an appropriate topic could be methods of textbook selection prior to the adoption year, or an introductory session on laboratory safety. "One-shot" workshops used to introduce research findings, teaching strategies or immediate curricular needs can be designed to offer high quality instruction, but suffer from the limited time the teachers and the consultant are in contact.

On the other hand, if teachers (or the community) demonstrate needs, either through surveys by the administration or by consensus, a bottom-up initiation of an in-service program can result. The administration, once made aware, can respond with appropriate in-service activities to address the needs.

According to Guerrero et al. (1989), successful in-service programs include the following characteristics:

- an emphasis on hands-on activities and practical techniques
- provision of time for participants to share experiences and information
- opportunities for new teachers to learn from experienced teachers

- provision for experienced teachers to act as trainers for the less experienced
- administrative support such as scheduling development activities at convenient times and locations and providing training that involves follow-up

Keys include time, teacher-teacher contact and administrative support.

Teacher Attitudes Towards In-Service Programs

Teacher attitudes about the in-service programs they attend are generally poor. A strong statement of opinion is given by Wood and Thompson (1980) when they state that in-service "teacher training, as it is now constituted, is the slum of American education. It is disadvantaged, poverty-stricken, neglected, and has little effect" (p. 374). Other teachers' opinions often mirror that sentiment toward traditional in-service programming.

"One-time" events, although widely used, have been shown to have little effect (Lawrence, 1974), and give too much information in too short a time. There is no allowing for the "opportunity for ongoing discussion of problems and concerns related to implementation, which is critical . . ." also, "teachers resent being in large groups where an 'expert' talked down to them" (Sparks, 1983). Schubert (1986) summarizes these shortcomings of the "one-shot" workshop by stating,

> How can a defensible professional service be rendered until the workshop leader knows the interests, needs, and situations of the participants? All that the best workshop leaders can provide is

> highly generalized presentations that relate inadequately to participants. The workshop idea, as presently practiced, is a waste of professional time and effort (p. 387).

One possible reason for the existence of the one-time event is that administrators fail to acknowledge that the real experts--those that know their needs best--are right under their noses (Westcott, 1987). By prescribing and diagnosing for teachers, and not treating them like professionals, supervisors incur opposition to the behaviors they are attempting to foster (Rodriguez & Johnstone, 1986). McLaughlin and Marsh (1979) provide one teacher's view of this resistance:

> This project hasn't worked out and its main effect has been to cause a close, well-organized faculty to turn to distrust each other. This was the result of forcing a program on a school, using an outside coordinator unfamiliar with the school and faculty, and not having the full support of the teachers. I personally felt the project ideas were good and could have worked if the teachers in our school had been involved in the planning (p. 74).

Without proper administrative support, in-service is hindered. Supervisors must provide the environment to bring about instructional improvements (Lieberman & Miller, 1981). Without such an environment, in-service will not accomplish its goal. Administrative support, however well-intentioned, can be misguided. Van Cleaf and Reinhartz (1984) state that "The short-term approach precludes constructive change because the teachers do not have time to gradually integrate the ideas into their own classrooms. . . . (P)erhaps the most glaring weakness of the inservice mode of effecting educational change is the lack of

follow-through after an inservice session" (p. 167). Another major obstacle to effective staff development is the lack of a coherent, long-term plan that incorporates district goals with personal career goals and opportunities for teachers (Kyle & Sedotti, 1987; Goodlad, 1984).

Other models than the one-shot inspirational message at the beginning of the year have met with success, however. One top-down program that has typically been received well by teachers is Writing Across the Curriculum which was designed to train all teachers to be teachers of writing and to develop student writers. The in-service consisted of a full day session before school began. Four half-day follow-up sessions (during school time) were scheduled approximately 6 weeks apart throughout the school year. Evaluation indicated favorable teacher attitudes toward this model as well as improvement in student performance (Ellis & Obermiller, 1989). It should be emphasized that this in-service strongly involved teachers as participants, and was definitely not a "one-shot" event.

In general, bottom-up initiated programs have been found to achieve success more quickly than top-down programs (Kyle & Sedotti, 1987). However, both programs designed solely by teachers or by administrators resulted in a lack of interest and enthusiasm. Collaborative planning by teachers and administration is necessary for long-term success (McLaughlin & Marsh, 1979). One bottom-up program that has met with success is the Effective Schools Professional Development Committee of Henry Wise Wood

High School of Calgary, Canada. Five principles that have guided this program include:

1. Teachers benefit from individual, small-group, and large-group professional activities, so each must be encouraged in the school.
2. Professional development is most effective when undertaken voluntarily by individuals.
3. Growth activities should build upon the strengths, interests, and talents of each teacher, and must be relevant.
4. Professional development activities can stimulate awareness in teachers of their level of skill development, leading to celebration as well as growth.
5. Growth can be enhanced through a collegial support system that values growth activities, provides moral support, and facilitates small groups (Paquette, 1987, p. 37).

In order for these practices to be utilized, it is evident that teachers must be included not only in addressing the needs of their profession (Bellon, Bellon, & Blank, 1991), but also in the design of the in-service programs to satisfy those needs (Lambert, 1989). In short, teachers must become empowered. Ellis and Obermiller envision "teachers to become partners with the district in the design of their professional development and to become active learners in the mastery of new programs and techniques" (1989, p. 5). Empowerment does not mean that teachers will necessarily usurp the principal's authority, but rather that each will gain the "power to exercise one's craft with quiet confidence and to help shape the way the job is done" (Maeroff, 1988, p. 475). Maeroff continues by urging that administrators engage in more collaboration with teachers, especially in the area of in-service

education. In-service becomes a more effective, meaningful event that is done with, not to, teachers.

Peer Teaching/Peer Learning for In-Service Teachers

Cooperative learning is a social model that involves peers teaching peers. This can be applied to both students and teachers. Johnson and Johnson (1975, 1981) defined five characteristics of this type of approach:

- Positive interdependence
- Verbal, face-to-face interaction
- Individual accountability
- Social skills
- Group processing

All of these components allow for the professional and personal growth of teachers that is a goal of in-service. Glatthorn (1987) claims that cooperative professional development is more successful when the following conditions are met:

- There is strong leadership at the district level.
- There is strong leadership at the state level.
- There is a general climate of openness and trust between administrators and teachers.
- The cooperative programs are completely separate from the evaluation process.

- The cooperative programs have a distinct focus and make use of a shared language about teaching.
- The district provides the resources needed to initiate and sustain the cooperative programs.
- The school makes structural changes needed to support collaboration through physical changes and scheduling to allow teachers to work together.

Since the expressed purpose of in-service is the behavioral change of teachers in a specific area, with the ultimate goal of student achievement, the means of its administration is of vital importance. Peer teaching/peer learning can be used in a successful in-service plan.

A major way in which administrators can effectively use resources and simultaneously treat teachers as professionals is to use a collegial staff development model, which Sparks (1983) claims "shows promise for creating a positive context for in-service activities." Teachers can provide to their fellows that which an "expert" cannot: "proximity, immediacy, and a first-hand knowledge of the other's workspace" (Alfonson & Goldsberry, 1982). Research has indicated that teachers "want their building administrators to participate in, not provide for, their professional growth activities. In addition, . . . a long-range program that provides follow-up practice, coaching, and peer support" appears to advance positive results (Rodriguez & Johnstone, 1986). A positive gain in attitude toward coaching, or peer teaching, has been

demonstrated in research done on the Teachers Teaching Teachers Staff Development Model of Indiana (Swan et al., 1988).

Benefits of Cooperative Learning In-Service Training

Glen Harper (1988) defines this type of in-service well. "Whether we call it cooperative, collegial, collaborative, or coaching, it is the method of educators teaching educators within the school setting" (p. 6). Empowerment, peer rapport, improved morale, teacher autonomy, teacher ownership, and professionalism are enhanced through small, content-oriented workshops. Sparks (1983) indicates that of participants who share a peer group experience, 90 percent report appreciation of the "personal nature" of the workshops. Teacher autonomy and empowerment are natural results of "teacher ownership" of the in-service process (Garmston, 1987). The isolation that often accompanies being a teacher can be alleviated through collegial endeavors. Wildman and Niles (1987) state:

> Collaboration naturally complements autonomy. Freedom to direct one's own learning is a vital aspect of collaboration. Collegial groups must be flexible in their composition and purpose. They must form and disintegrate based on the needs of individual teachers. And it is teachers who must decide on the specifics of their collaboration. Control of collegiality, either externally or hierarchically, is antithetical to the basic concept. Professionals cannot be forced to be collegial (p. 8).

The positive attitude gained by teachers toward peer teaching and collaborative efforts can result in many benefits, not only for the teacher but eventually for the student, which is the intent of staff development. Tishler and

Nichols (1989) give a number of reasons why teachers prefer peer assistance workshops:

> . . . peer teachers provide practical ideas that can be implemented in the classroom, workshops conducted the exchange of ideas, peer teachers have experienced-based credibility, and the teacher-consultant has a working knowledge of the problems and concerns of the participating teachers. . . . In general, these workshops seem to provide an environment of collaborations and fellowship from which participating teachers took workable ideas and the confidence to implement those ideas (pp. 11-12).

As teachers' attitudes towards in-service become more positive, their teaching behavior should also change. As Jerome Bruner (1962) observed, "[w]hether for reasons of cognitive economy or for the protection of self-esteem, people wish to see their acts as derived from, or congruent with, experience" (p. 133). Cooperative in-service programs provide a means for strengthening the teacher's repertoire without ridicule. With the addition of new teaching strategies and the support from a collegial peer group, a teacher should be able to better serve the students and provide for their improving achievement.

Summary of Major Findings

The reform movements of the 1980s have brought considerable public attention to "the rising tide of mediocrity" (NCEE, 1983, p. 5) that is present in our current educational systems. To combat the threats to our society that being technologically underprepared would present, reformists have proposed many changes. Often overlooked in the rhetoric is how these changes are to be successfully implemented into existing systems. For teachers already

employed, in-service programs should provide the vehicle for staff development and ultimately, the necessary student achievement. Teachers need continuing professional staff development to remain abreast of current thought and techniques in their subject areas (Champagne, 1980; Evans, 1987; Spector, 1987). Wood and Thompson (1980) state that attitudes of teachers toward in-service programs are generally poor, with good reason. Traditional teacher in-service programs have been largely ineffective because they have been designed without involving teachers directly in the process (Sparks, 1983; Westcott, 1987; Rodriguez & Johnstone, 1986). Administrators can remedy this situation by providing an environment that will allow for peer teaching (Rodriguez & Johnstone, 1986). Research has substantiated that a positive attitude toward peer teaching exists (Swan et al., 1988; Sparks, 1983). This positive attitude toward peer teaching can be utilized in meeting the goal of staff development through in-service programs (Wildman & Niles, 1987). Tishler and Nichols (1989) stress the practical gains to be achieved through cooperative, peer learning workshops.

CHAPTER III

PROCEDURES

Introduction

This study was done using a quasi-experimental design and was of the nonequivalent control group type. Two populations were investigated. These included all the biology teachers and all the chemistry teachers in Knox County. From each population, two groups were formed. Non-participants were those teachers who elected to attend only the mandatory regular in-service offerings of Knox County Schools. The participants were self-selected from each population. These represented two independent groups, subjected to a similar treatment. The treatment consisted of a series of collegial, cooperative learning in-service programs. Biology and chemistry populations were not compared to each other.

Sample

The self-selection came from the 44 (increased to 48 for the year 1990-91) biology and 22 chemistry teachers of Knox County. These groups represented the entire populations of biology and chemistry teachers. Participants included those that attended one, two or three cooperative learning in-service meetings during 1 calendar year from the Spring 1990 to

the Spring 1991. Those teachers (non-participants) who did not attend any meetings formed the bases for comparison.

Measuring Instrument

The pretest and posttest for the measurement of attitude toward in-service (the dependent variable) was a variation of Jensen's Teacher In-service Education Inventory (see Appendix G). This instrument is a published semantic differential type attitude scale (Zigarmi, Betz, & Jensen, 1977). The Likert scale was changed from 1 to 4 to 1 to 6 in order to increase the range from disagree to agree to strongly disagree to strongly agree. Statements 7 and 8 were made more definitive by removing the words "most" and "some". Statement 10 of Jensen's inventory, which concerned administrators, was eliminated. A request for subjective comments about in-service was added. This test allowed the examiner to employ projective techniques to convert attitudes into measurable indices.

Procedures

The study took place over 1 calendar year. The pretest was administered to all of the biology and the chemistry teachers at the beginning of the first program for those in attendance, or within 1 week for those not in attendance. Three programs for each biology and chemistry population were held: Spring, 1990; Fall, 1990; and Spring, 1991. After the third program, a posttest (the same instrument as the pretest) was given to all participants and non-participants.

A Chronological Account of the Procedures

1. In order to compare attitudes of in-service to the traditional model, it was first necessary to create the alternative, collegial model. Conversations with Mr. Bob Chambers, Knox County Science Supervisor, were held in the Spring of 1989. Formal written permission was granted to conduct this study in Spring of 1990 (see Appendix H), with the understanding that attendance to any program would give a participant credit for 2 hours of the 6 hours of in-service per year that every teacher of the Knox County System is expected to perform, other than that on in-service days. Guidelines for these 6 hours can be found in Appendix I.

The alternative in-service that was to be the treatment was based on the theory of cooperative learning. Knox County science in-service heretofore had used the traditional, one-shot model. It was hypothesized that teachers would develop a more positive attitude toward in-service if teachers taught teachers. Each in-service program was discipline specific (biology or chemistry), with practical teaching ideas providing the content. Attendance was voluntary, with the in-service credit (2 hours) the only tangible reward.

A typical program was held on a week night at a school whose faculty agreed to be the hosts. The hours were from 7:00 to 9:00. The researcher coordinated the agenda, arranging beforehand for teachers who would present ideas. Five to seven presentations made for a full evening. Questions and comments were encouraged.

2. In the Fall of 1989, letters were sent to every biology and chemistry teacher announcing the alternative, cooperative learning in-service program (see Appendix H). The response from both populations was sufficient to proceed with the project.

3. Teachers who had indicated that they wished to present an idea at the first meeting were contacted, and dates and sites for both biology and chemistry programs were chosen for the Spring of 1990. To maintain a non-threatening environment, it was decided to hold these meetings within the schools. The first school was the researcher's. Announcement letters were sent to all biology and chemistry teachers to inform them of their respective program dates (see Appendix H).

4. Permission from Dr. Darrell Jensen to use his in-service inventory was received in the Winter of 1990 (see Appendix H). At the beginning of the first meetings, the survey was administered. The next day, surveys were mailed to those not in attendance.

5. At the end of each of the first meetings, those in attendance expressed a desire to continue. Tentative dates and sites were selected for the Fall, 1990 meetings.

6. Mr. Chambers verbally assented to the continuation of the project for the school year 1990-1991.

7. Letters and announcements (see Appendix H) were sent to all teachers 4 weeks prior to the programs. Teachers who wished to present ideas were

arranged to do so. Again, at the close of both meetings, those in attendance indicated a desire to have another meeting. Tentative dates and sites were selected for the Spring, 1991 programs.

8. Letters and announcements (see Appendix H) were sent, and presenters were arranged. At the close of each Spring meeting, the post-treatment survey was given. The next day, surveys were sent to all biology and chemistry teachers not in attendance. One section of the demographic data enabled the researcher to indicate the number of programs attended. A cover letter (see Appendix G) instructed each teacher (whether as a participant or non-participant) how to answer the survey.

9. The data were analyzed using SAS, the statistical analysis system.

Data Analysis

The data analyzed were designed to indicate whether a positive difference existed in posttest measures of attitude toward in-service between participants and non-participants. This was done for both biology and chemistry teachers and the two populations as a single group. The projective techniques allowed by the instrument enabled the researcher to convert the ordinal data to interval data from which means were compared.

CHAPTER IV

ANALYSIS OF DATA

Analysis of Data

Introduction

This section contains background information pertinent to the analysis of the data and an examination of each hypothesis of the study.

Background Data

The populations in the study consisted of the 44 to 48 biology teachers and the 22 chemistry teachers of the Knox County School System. These populations represent all the biology and chemistry teachers from the 15 high schools, excluding one chemistry position at one high school. This position was held by the author. The populations remained nearly constant during the study, with the increase of four biology teachers to 48 for the 1990-91 school year, and the replacement of one chemistry teacher over the same period.

At the beginning of the study in April of 1990, both populations were administered the altered Jensen's Teacher In-service Education Inventory. Thirty of 44 biology teachers returned this pre-treatment survey, and 20 of 22 chemistry teachers responded. Only one mailing was used.

Following the third in-service program in April of 1991, the same survey instrument was used for each population. Two mailings were used to obtain

these results. Of the 48 biology teachers surveyed, 41 responded. Of these 41, 15 had participated in one or more of the programs (31.2 percent of the population). Of the 22 chemistry teachers surveyed, 18 responded. Of these 18, 14 had attended one or more of the programs (63.6% of the population). Table 1 shows the attendance by population for each meeting. Table 2 shows the participation by population for each meeting.

The data analysis was made using the SAS (statistical analysis system) program. Pertinent demographic data were obtained. Means and standard deviations for statements 1 through 10 were determined. All pre- and post-treatment comments for statement 11 are recorded in Appendices A-F.

Examination of Hypotheses

H_1--Biology and chemistry teachers as a group who participate in the cooperative learning in-service program will show a gain in positive attitude toward in-service programs.

Figure 1 indicates gains in positive attitude for biology and chemistry participants as a group for each of statements 1 through 10 of the survey. Tables 3 and 4 and Figure 2 show that the means for all statements (except 4 and 5) are separated by a band of more than one standard deviation around each mean.

TABLE 1

ATTENDANCE BY POPULATION

Date	Biology	Chemistry
Spring 1990	8	9
Fall 1990	14	11
Spring 1991	6	6

TABLE 2

PARTICIPATION BY POPULATION

Total Meetings Attended	Biology	Chemistry
0	33	8
1	6	8
2	6	4
3	3	2

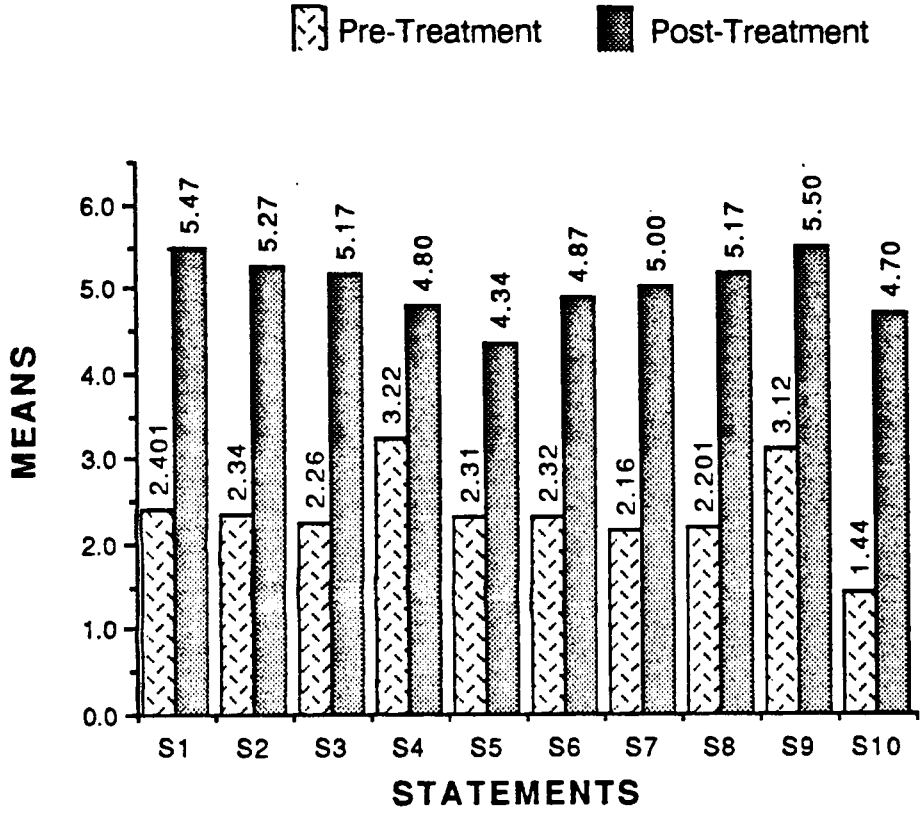

Figure 1. Biology and chemistry participants pre/post-treatment survey results.

TABLE 3

BIOLOGY AND CHEMISTRY PARTICIPANTS POST-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	5.47	0.73
2	5.27	0.91
3	5.17	0.83
4	4.80	0.84
5	4.34	1.20
6	4.87	1.07
7	5.00	1.17
8	5.17	1.15
9	5.50	0.82
10	4.70	1.64

TABLE 4

BIOLOGY AND CHEMISTRY TEACHERS PRE-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	2.40	1.26
2	2.34	1.14
3	2.26	1.12
4	3.22	1.12
5	2.31	1.11
6	2.32	1.08
7	2.16	1.00
8	2.20	1.16
9	3.12	1.28
10	1.44	0.73

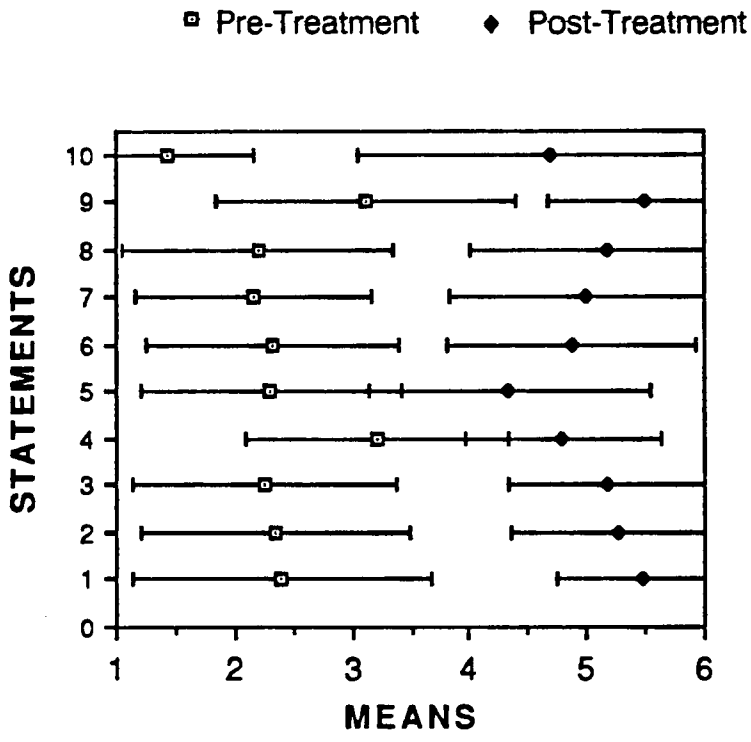

Figure 2. Biology and chemistry participants pre/post-treatment survey results graph of means and standard deviations.

Figure 3 shows little change in attitude toward in-service for non-participants. Tables 4 and 5 and Figure 4 reveal means for statements 1 through 10 that are well within one standard deviation.

A comparison of non-participants and participants (Figure 5, Tables 3 and 5, Figure 6) shows that participants had greater means for all statements, with only statements 4 and 5 overlapping within standard deviations about the post-treatment means.

On the pre-treatment survey, only statements 4 (mean = 3.22) and 9 (mean = 3.12) exhibited values (> 3.00) that can be interpreted as agreeing with the statement. On the post-treatment survey, the lowest mean for all statements for participants was 4.34. For non-participants, all means fell below 3.00.

H_2--Biology teachers who participate in the cooperative learning in-service program will show a gain in positive attitude toward in-service programs.

Biology teachers showed gains in positive attitude for all statements 1 through 10 (see Figure 7). Only questions 4 and 5 exhibited an overlap of standard deviations around the pre- and post-treatment means (see Tables 6 and 7, Figure 8).

Figure 9 indicates little change in attitude for biology non-participants for all statements 1 through 10. All means fell well within one standard deviation (Tables 6 and 8, Figure 10).

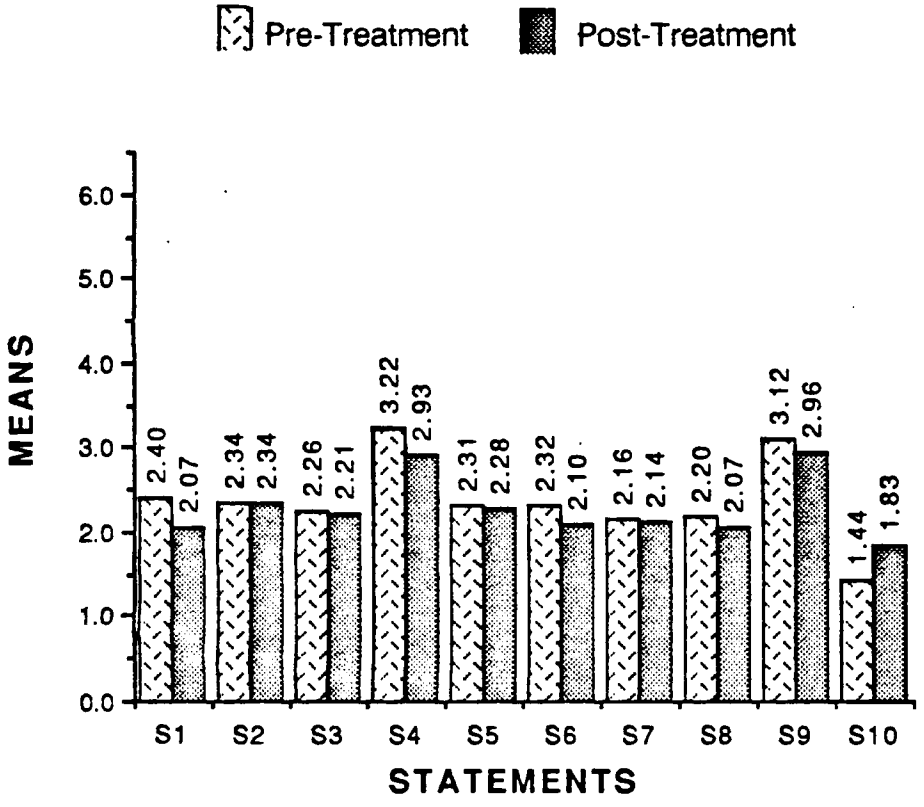

Figure 3. Biology and chemistry non-participants pre/post-treatment survey results.

TABLE 5

BIOLOGY AND CHEMISTRY NON-PARTICIPANTS POST-TREATMENT

SURVEY MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	2.07	0.84
2	2.34	1.04
3	2.20	1.21
4	2.93	1.13
5	2.28	1.18
6	2.10	1.11
7	2.14	1.27
8	2.07	1.03
9	2.96	1.40
10	1.83	1.10

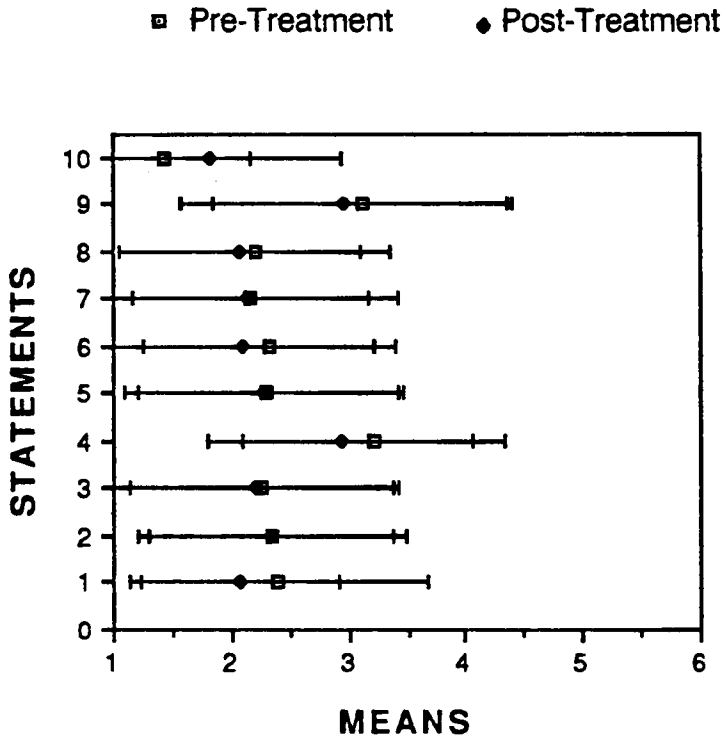

Figure 4. Biology and chemistry non-participants pre/post-treatment survey results graph of means and standard deviations.

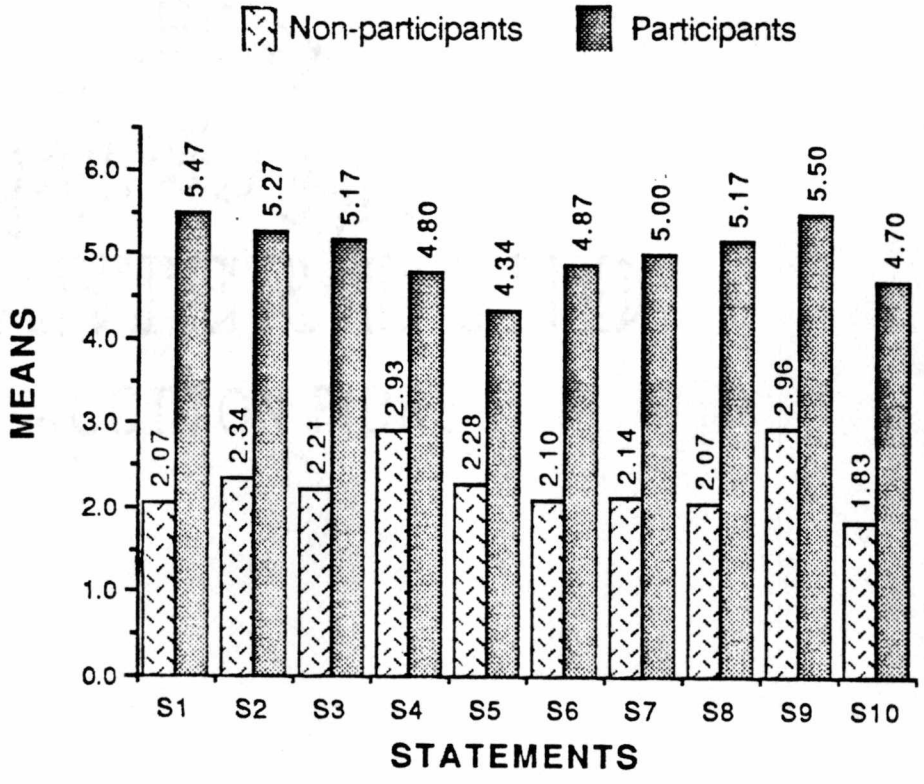

Figure 5. Biology and chemistry non-participants and participants post-treatment survey results.

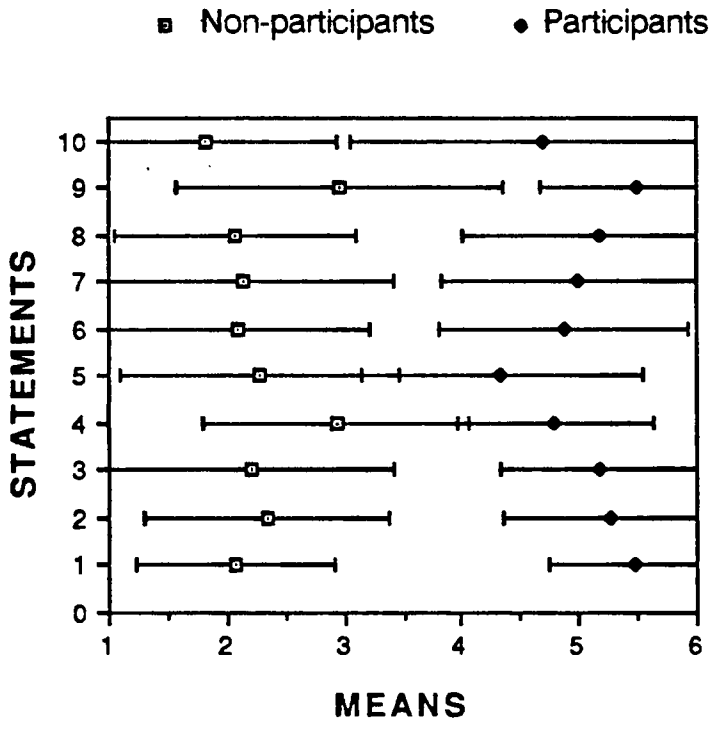

Figure 6. Biology and chemistry non-participants and participants post-treatment survey results graph of means and standard deviations.

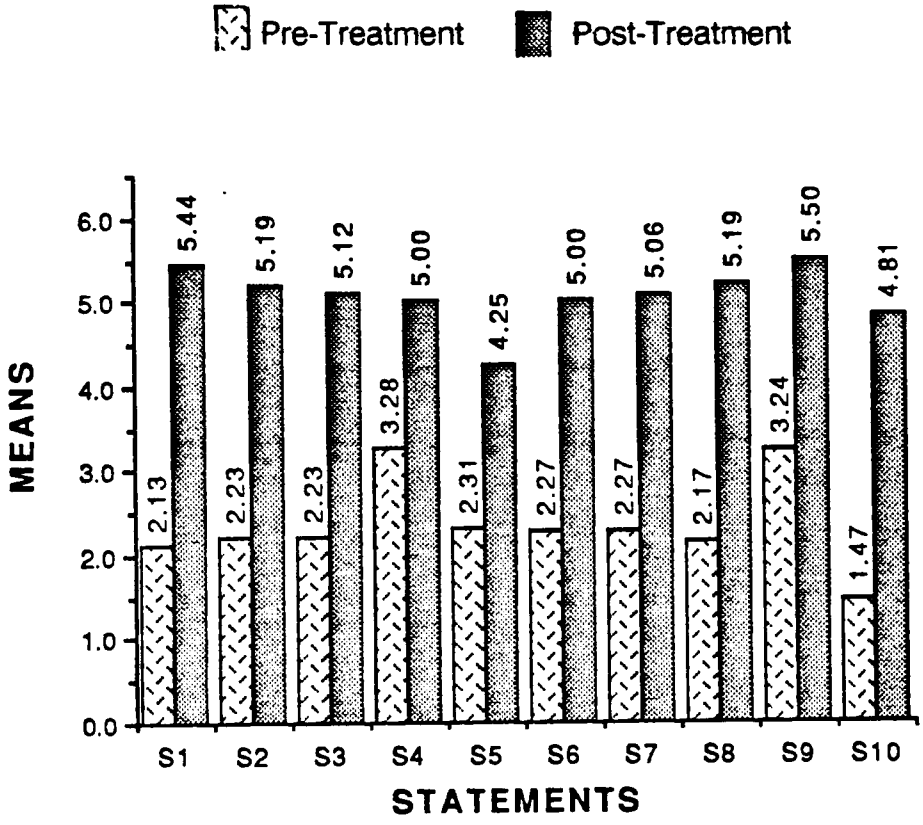

Figure 7. Biology participants pre/post-treatment survey results.

TABLE 6

BIOLOGY TEACHERS PRE-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	2.13	1.20
2	2.23	1.19
3	2.23	1.10
4	3.28	1.10
5	2.31	1.14
6	2.27	1.11
7	2.27	1.05
8	2.17	1.12
9	3.24	1.18
10	1.47	0.78

TABLE 7

BIOLOGY PARTICIPANTS POST-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	5.44	0.81
2	5.19	0.98
3	5.12	0.81
4	5.00	0.63
5	4.25	1.18
6	5.00	0.97
7	5.06	1.24
8	5.19	1.22
9	5.50	0.89
10	4.81	1.76

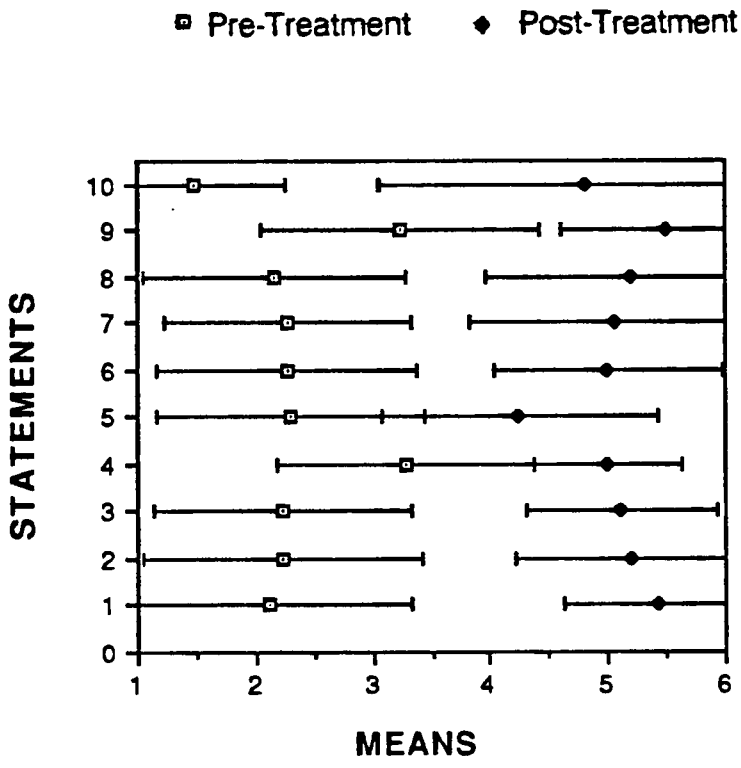

Figure 8. Biology participants pre/post-treatment survey results graph of means and standard deviations.

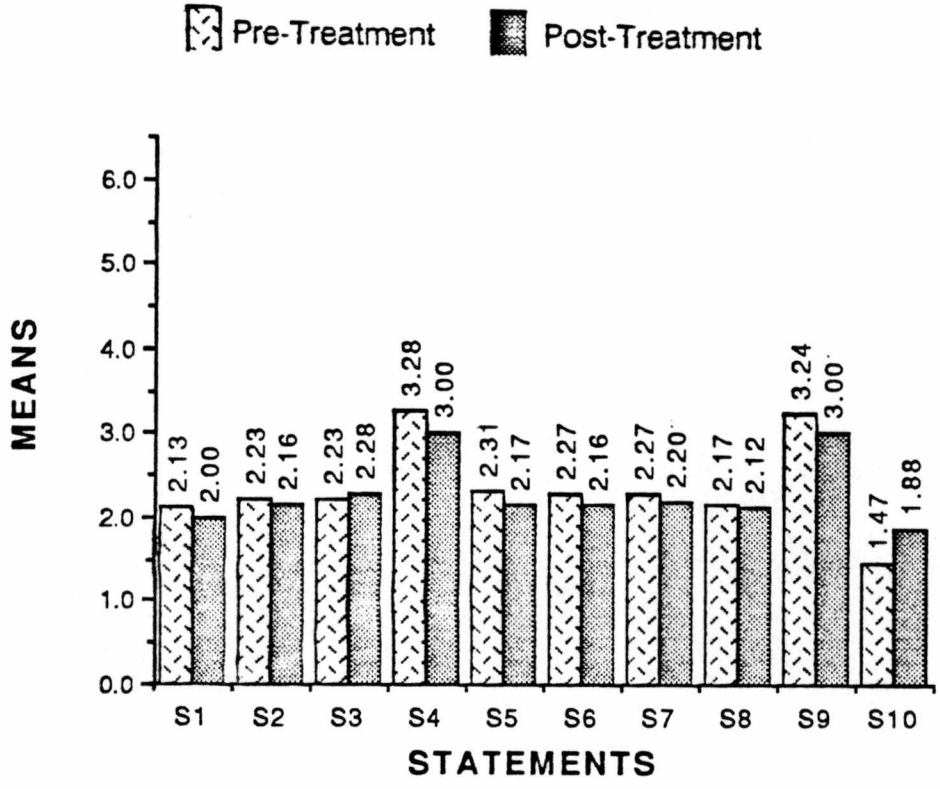

Figure 9. Biology non-participants pre/post-treatment survey results.

TABLE 8

BIOLOGY NON-PARTICIPANTS POST-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	2.00	0.87
2	2.16	0.99
3	2.28	1.28
4	3.00	1.19
5	2.17	1.13
6	2.16	1.18
7	2.20	1.29
8	2.12	1.09
9	3.00	1.41
10	1.88	1.17

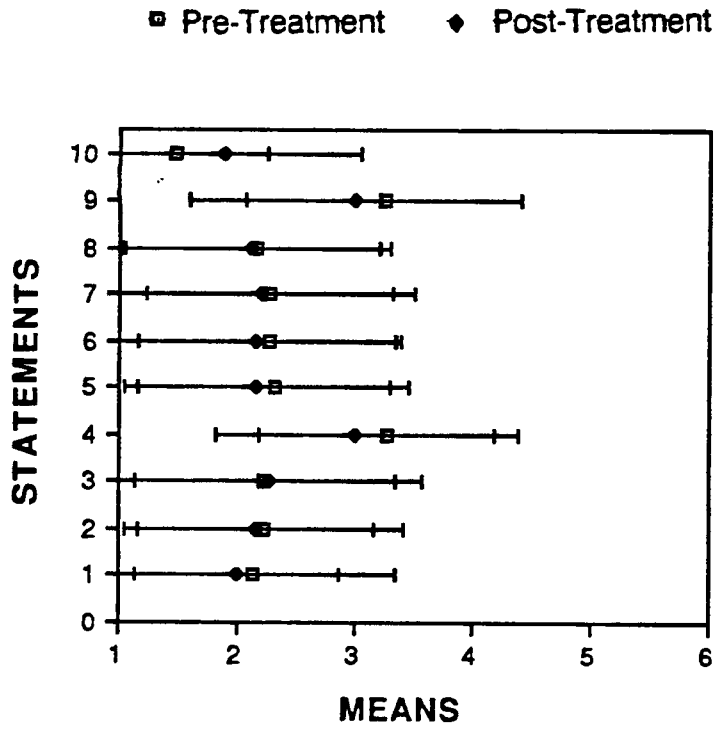

Figure 10. Biology non-participants pre/post-treatment survey results graph of means and standard deviations.

Participants' means exceeded non-participants' means for all statements 1 through 10 (see Figure 11). Only statements 5 and 10 showed overlap within standard deviations of pre- and post-treatment means (see Tables 7 and 8, Figure 12).

Pre-treatment comments from the 30 biology teachers (27 answered, see Appendix C) for statement 11 were generally negative to neutral toward system in-service programs. Only those in-service programs conducted within schools (departmental) received consistently positive responses. Also, in-service days on which teachers were allowed to work in their classrooms rather than attend programs were viewed positively.

Post-treatment comments from the 26 biology teachers who did not attend the cooperative learning in-service programs for statement 11 (16 answered, see Appendix E) mirrored the pre-treatment responses in their negative tone. Complaints were similar, with time allowed in school viewed positively.

Biology teachers who participated in the cooperative learning in-service programs (N = 15, 12 answered, see Appendix A) were all positive in their responses to statement 11. The comments were consistent in appreciating the practical ideas acquired and the support of other teachers.

On the pre-treatment survey, only statements 4 (mean = 3.28) and 9 (mean = 3.24) resulted in values that can be interpreted as agreeing with the statements. On the post-treatment survey, the lowest mean for all statements for participants was 4.25. For non-participants, all means were 3.00 or less.

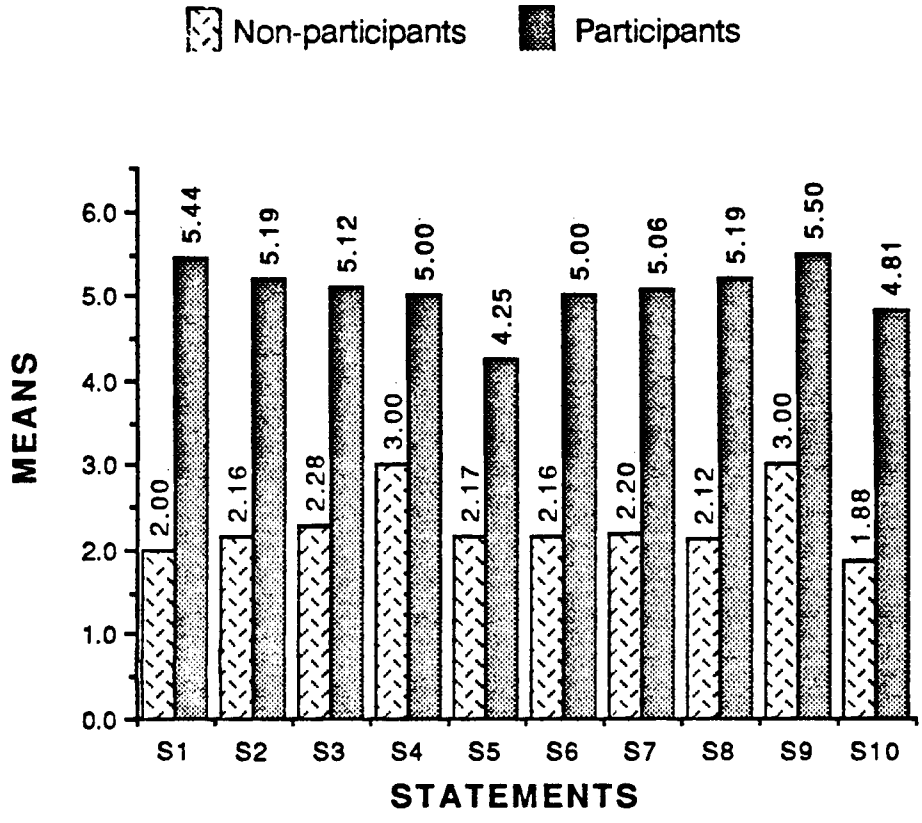

Figure 11. Biology non-participants and participants post-treatment survey results.

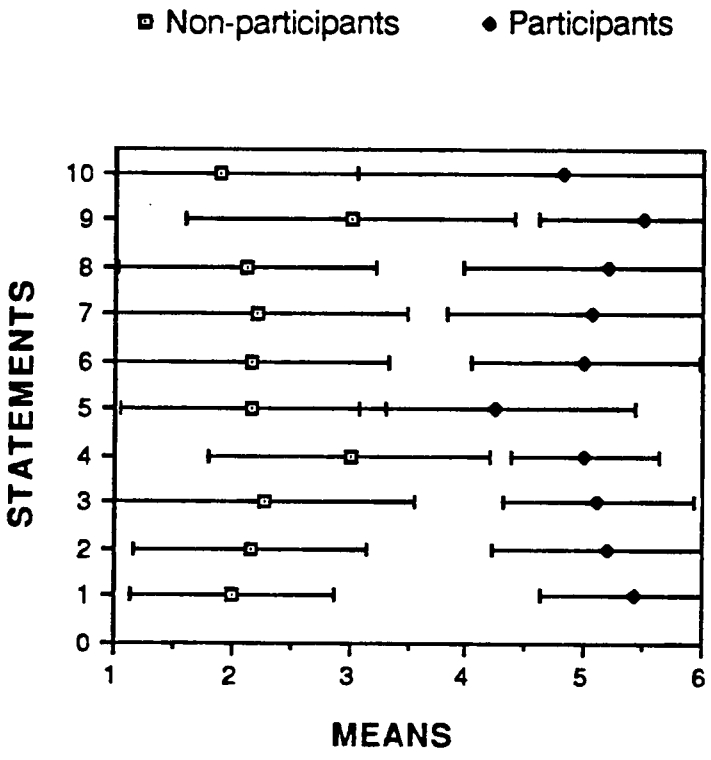

Figure 12. Biology non-participants and participants post-treatment survey results graph of means and standard deviations.

H_3--Chemistry teachers who participate in the cooperative learning in-service program will show a gain in positive attitude toward in-service programs.

Chemistry participants showed gains in positive attitude for all statements 1 through 10 (see Figure 13). Only statements 4 and 5 revealed an overlap of standard deviations around the pre/post-treatment means (see Tables 9 and 10, Figure 14).

The means for statements 1 through 10 for chemistry non-participants pre/post-treatment surveys showed little change in attitude toward in-service (see Figure 15). All means fell well within one standard deviation (see Tables 9 and 11, Figure 16).

The means of the participants were distinctly greater than the non-participants (see Figure 17). Only statement 5 showed any overlap of standard deviations (see Tables 10 and 11, Figure 18).

Pre-treatment responses for statement 11 for chemistry teachers (N=20, 17 answered, see Appendix D) were generally negative. Any positive comments were directed toward time given during in-service days for housekeeping duties or that time for departmental meetings.

Post-treatment responses for statement 11 for those chemistry non-participants (N=4, 2 answers, see Appendix F) were negative to neutral.

Post-treatment comments from participant chemistry teachers (N=14, 11 responses, see Appendix B) were generally positive. Most expressed

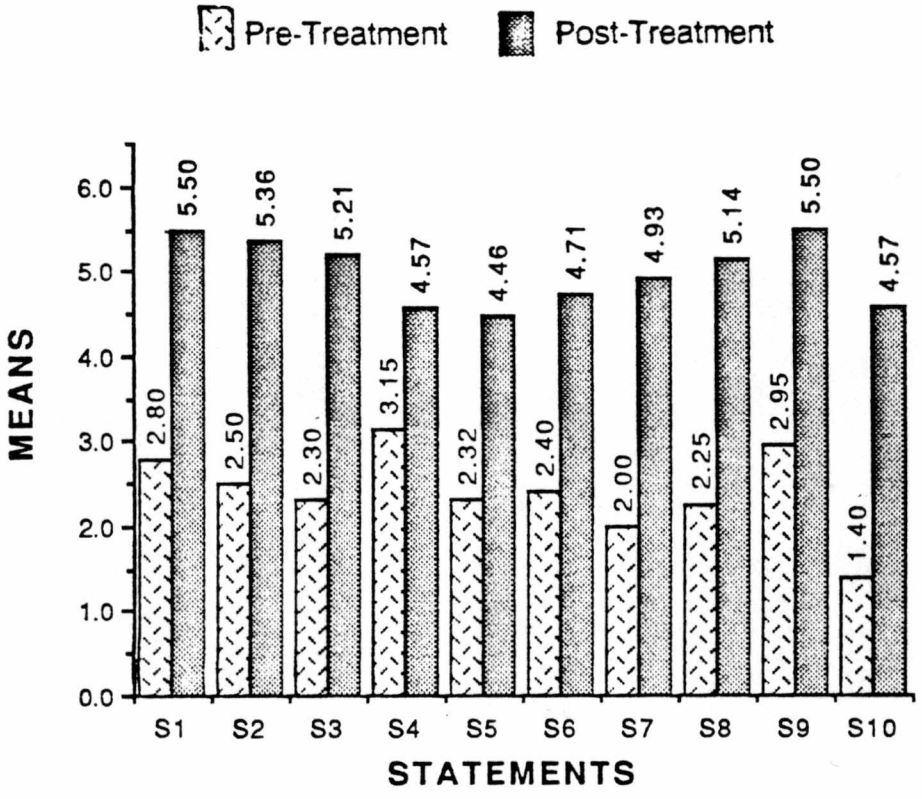

Figure 13. Chemistry participants pre/post-treatment survey results.

TABLE 9

CHEMISTRY TEACHERS PRE-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	2.80	1.28
2	2.50	1.05
3	2.30	1.17
4	3.15	1.18
5	2.31	1.11
6	2.40	1.05
7	2.00	0.92
8	2.25	1.25
9	2.95	1.43
10	1.40	0.68

TABLE 10

CHEMISTRY PARTICIPANTS POST-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	5.50	0.65
2	5.36	0.84
3	5.21	0.89
4	4.57	1.02
5	4.46	1.26
6	4.71	1.20
7	4.93	1.14
8	5.14	1.10
9	5.50	0.76
10	4.57	1.55

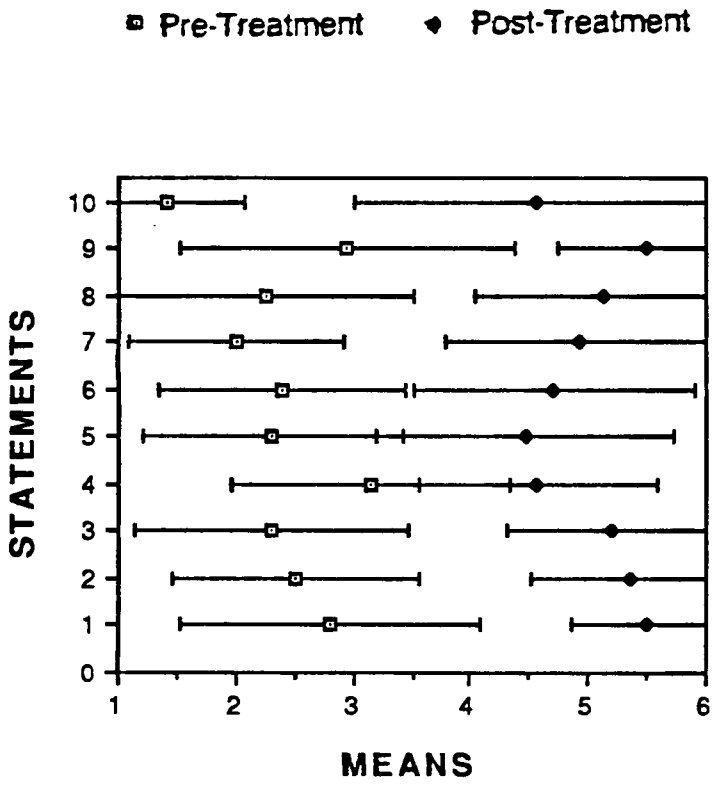

Figure 14. Chemistry participants pre/post-treatment survey results graph of means and standard deviations.

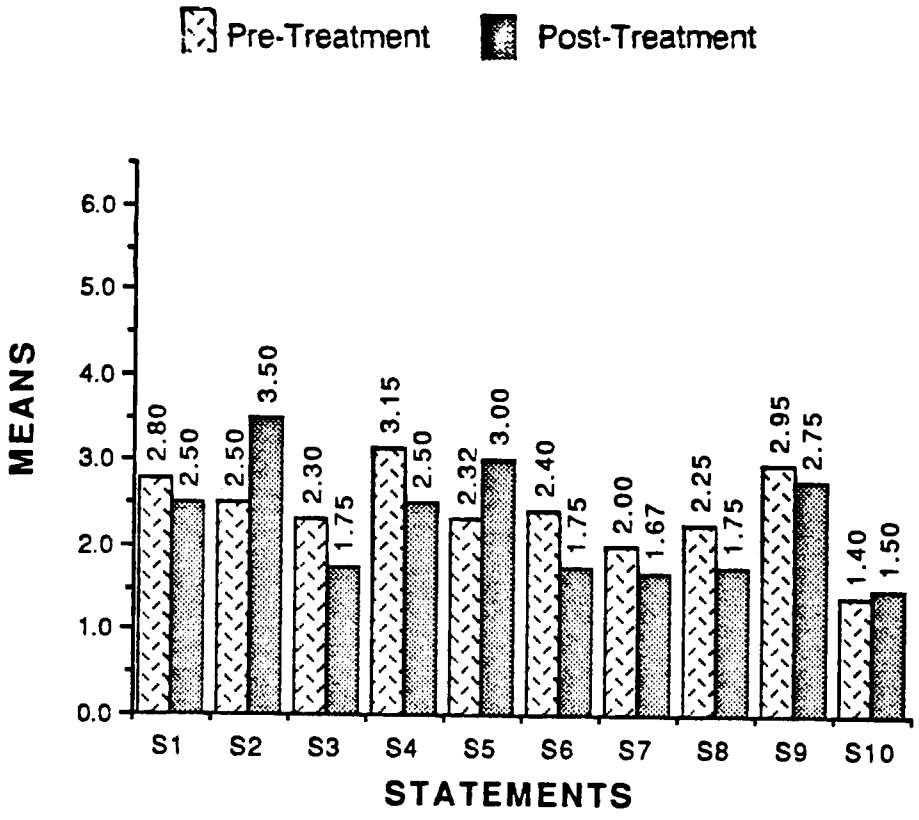

Figure 15. Chemistry non-participants pre/post-treatment survey results.

TABLE 11

CHEMISTRY NON-PARTICIPANTS POST-TREATMENT SURVEY

MEANS AND STANDARD DEVIATIONS

STATEMENT NUMBER	MEAN	STANDARD DEVIATION
1	2.50	0.58
2	3.50	0.58
3	1.75	0.50
4	2.50	0.58
5	3.00	1.41
6	1.75	0.50
7	1.67	1.15
8	1.75	0.50
9	2.75	1.50
10	1.50	0.58

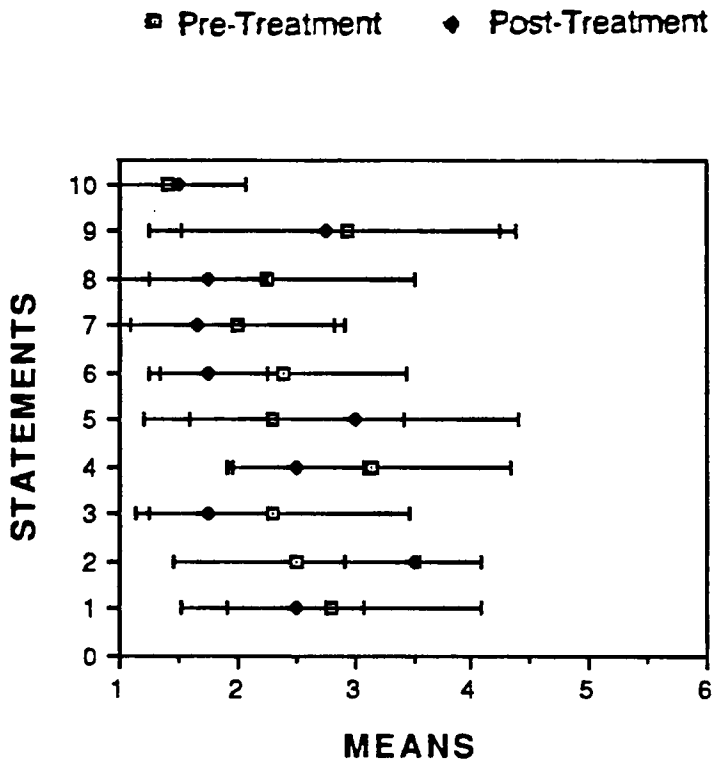

Figure 16. Chemistry non-participants pre/post-treatment survey results graph of means and standard deviations.

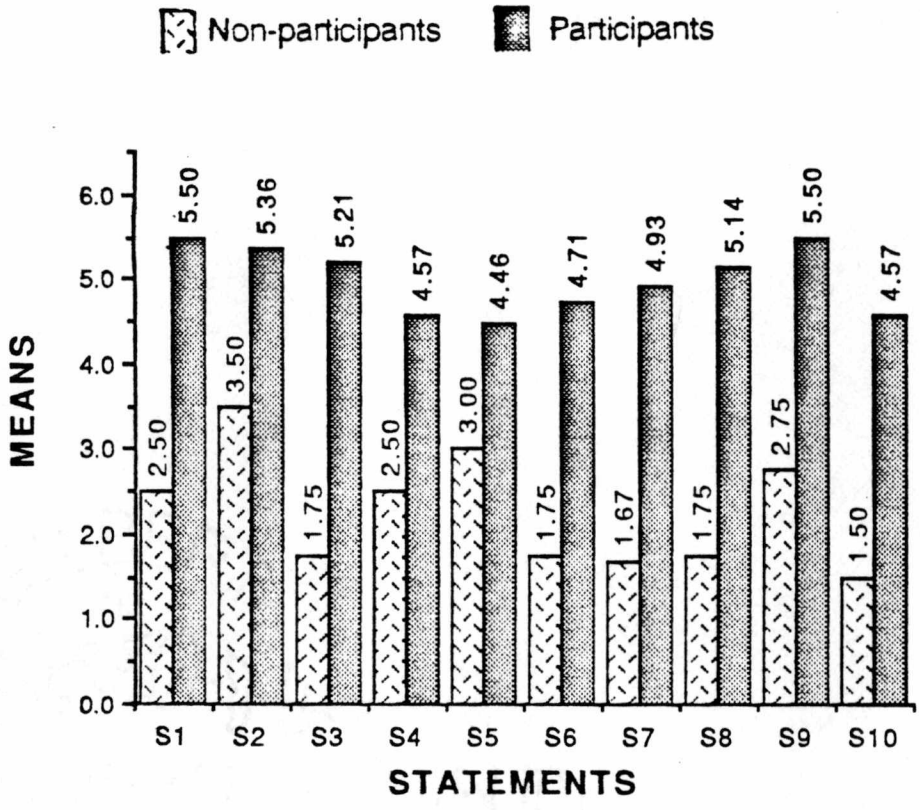

Figure 17. Chemistry non-participants and participants post-treatment survey results.

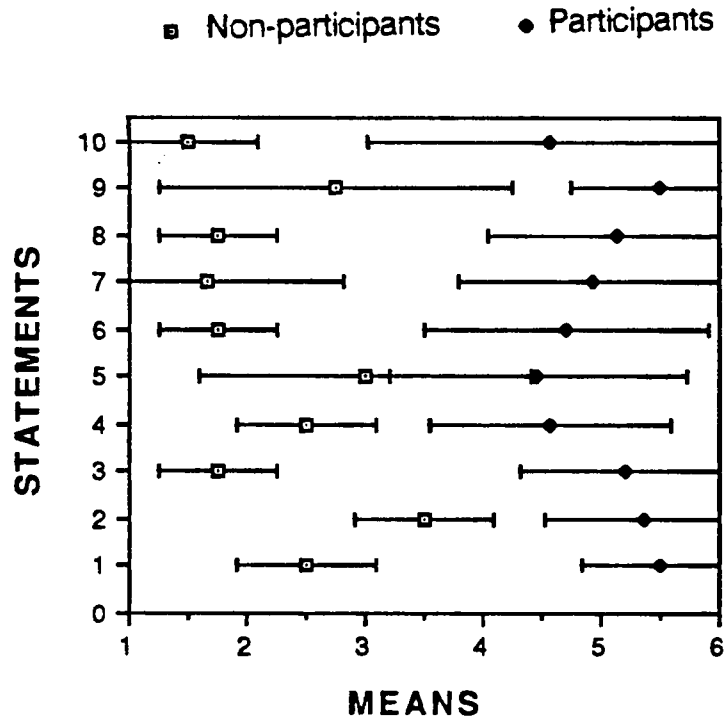

Figure 18. Chemistry non-participants and participants post-treatment survey results graph of means and standard deviations.

appreciation of the practical aspects and encouragement of the programs. There was one negative response.

On the pre-treatment survey, only statement 4 (mean = 3.15) resulted in a value that can be viewed as agreeing with the statement. On the post-treatment survey, the lowest mean for all statements for participants was 4.46. For non-participants, only statement 2 (mean = 3.50) was greater than 3.00.

H_4--Biology teachers with 10 years or less experience who participate in the program will show a greater gain in positive attitude toward in-service programs than biology teachers with more than 10 years experience who participate in the program.

Biology participants with 10 or less years experience exceeded participants with more than 10 years experience on the mean of only statement 4 (see Figure 19). Table 12 and Figure 20 indicate that the pairs of means for all statements 1 through 10 fall within the band width of one standard deviation.

H_5--Chemistry teachers with 10 years or less experience who participate in the program will show a greater gain in positive attitude toward in-service programs than chemistry teachers with more than 10 years experience who participate in the program.

Chemistry participants with 10 or less years experience exceeded participants with more than 10 years experience on the means of 7 of the 10 statements (see Figure 21). However, Table 13 and Figure 22 reveal that all pairs of means fall well within the band of one standard deviation.

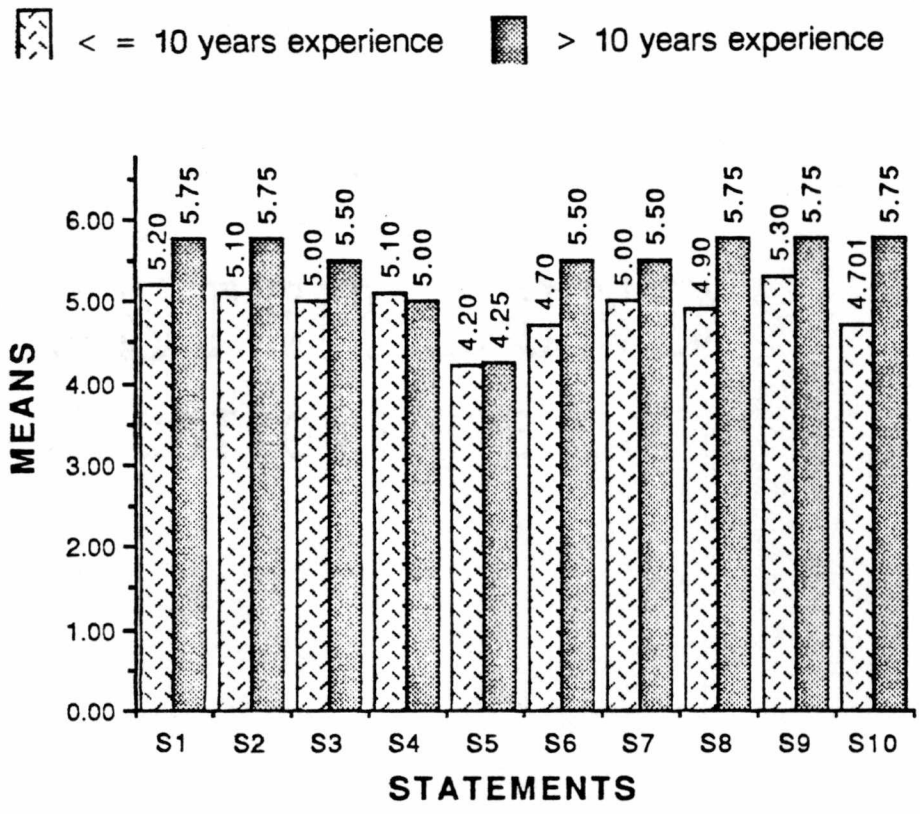

Figure 19. Biology participants post-treatment survey results based on years of teaching experience.

TABLE 12

BIOLOGY PARTICIPANTS POST-TREATMENT SURVEY MEANS AND STANDARD DEVIATIONS BASED ON YEARS OF TEACHING EXPERIENCE

	TEACHERS WITH ≤ 10 YRS EXPERIENCE		TEACHERS WITH > 10 YRS EXPERIENCE	
STATEMENT NUMBER	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
1	5.20	0.92	5.75	0.50
2	5.10	1.10	5.75	0.50
3	5.00	0.94	5.50	0.58
4	5.10	0.57	5.00	0.82
5	4.20	1.32	4.25	1.26
6	4.70	1.06	5.50	0.58
7	5.50	1.49	5.50	0.58
8	4.90	1.45	5.75	0.50
9	5.30	1.06	5.75	0.50
10	4.70	1.70	5.75	0.50

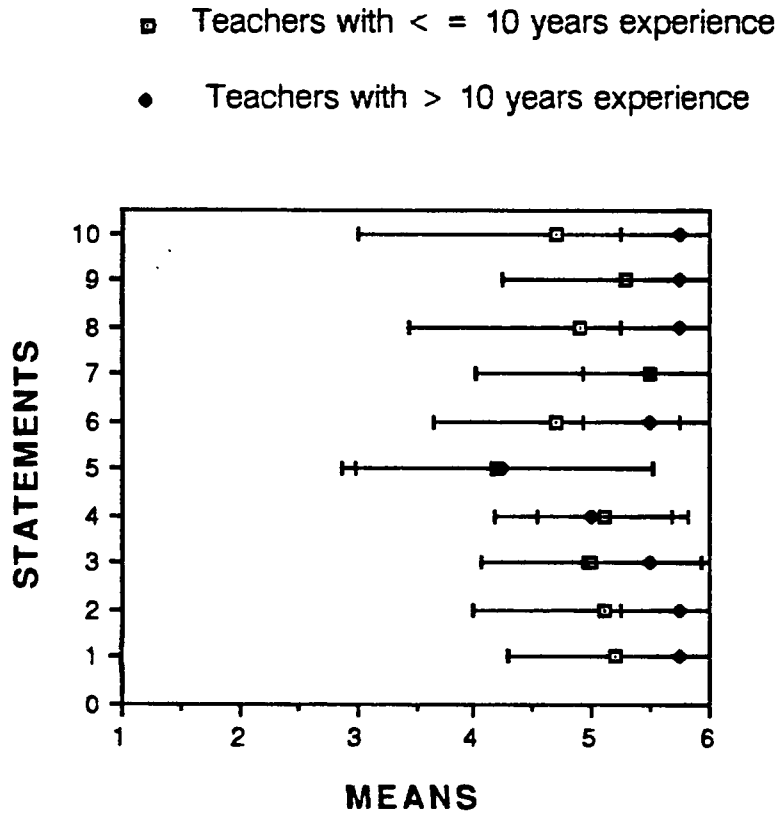

Figure 20. Biology participants post-treatment survey results based on years of teaching experience graph of means and standard deviations.

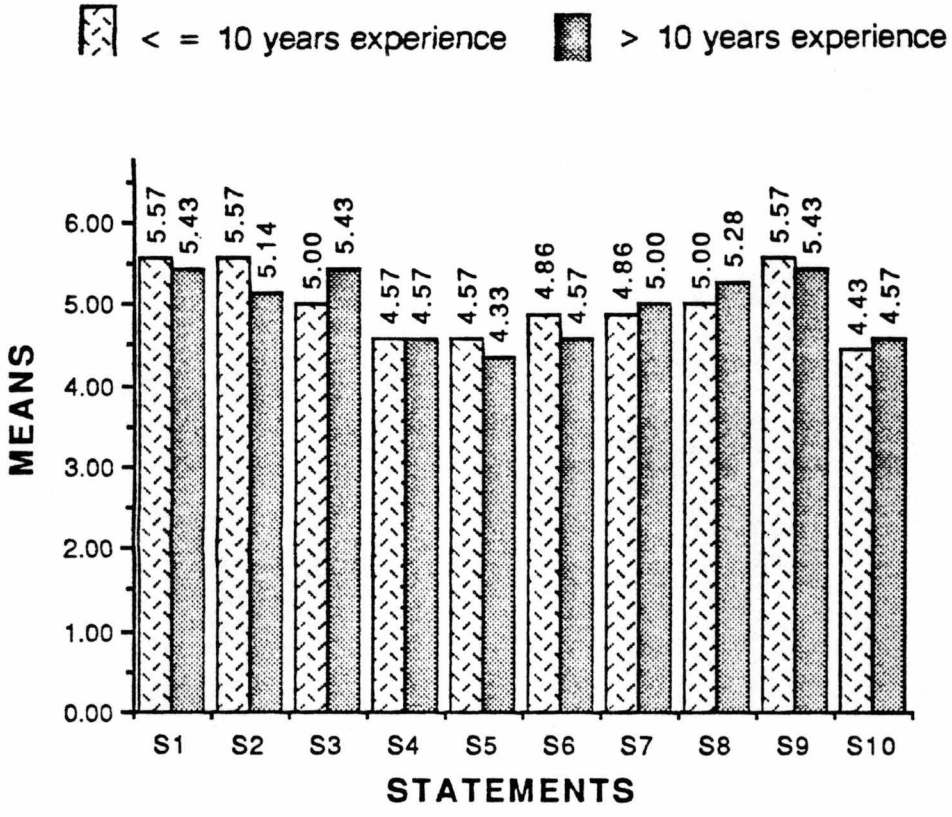

Figure 21. Chemistry participants post-treatment survey results based on years of teaching experience.

TABLE 13

CHEMISTRY PARTICIPANTS POST-TREATMENT SURVEY MEANS AND STANDARD DEVIATIONS BASED ON YEARS OF TEACHING EXPERIENCE

	TEACHERS WITH ≤ 10 YRS EXPERIENCE		TEACHERS WITH > 10 YRS EXPERIENCE.	
STATEMENT NUMBER	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
1	5.57	0.79	5.43	0.49
2	5.57	0.79	5.14	0.83
3	5.00	1.00	5.43	0.73
4	4.57	0.53	4.57	1.29
5	4.57	0.97	4.33	1.49
6	4.86	1.07	4.57	1.29
7	4.86	1.21	5.00	1.07
8	5.00	1.00	5.28	1.16
9	5.57	0.79	5.43	0.73
10	4.43	1.72	4.57	1.29

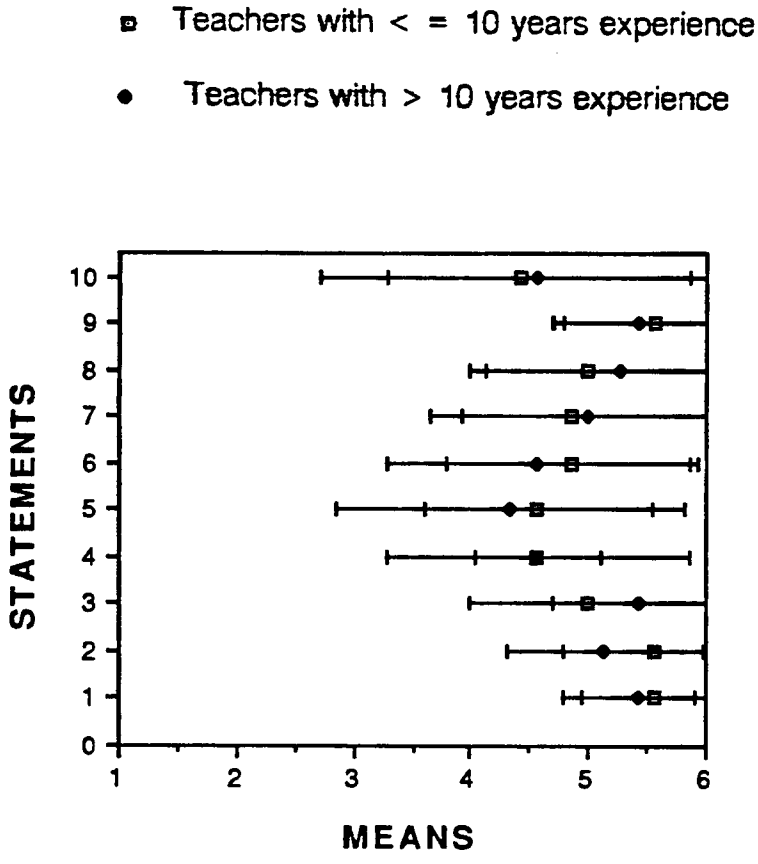

Figure 22. Chemistry participants post-treatment survey results based on years of teaching experience graph of means and standard deviations.

Summary

Data analyses contained in Chapter IV were based on pre-treatment and post-treatment survey means and standard deviations from the populations of biology and chemistry teachers. Participant and non-participant responses were compared with respect to gain in positive attitude toward in-service programs. Appropriate demographic data also provided analyses of years of experience as a possible determining factor in positive attitude gain toward in-service programs. An open-ended response section (statement 11) on the survey allowed for input by the respondents, which was analyzed accordingly as positive, neutral, or negative. The data were presented in graphical and tabular form, and in the Appendices.

CHAPTER V

RESULTS

Summary of Study

The reform movements of the 1980s called to public attention the seeming mediocrity of the United States' education systems, especially in the areas of science and mathematics. In an increasingly technological world, demands for improvement quickly followed. Frequent targets for reform by leading educators included curricular changes for students and pre-service requirements for upcoming teachers.

Teachers already employed, those who could most directly and immediately incorporate changes, largely continued to rely on two basic methods to grow professionally: continued education for advanced degrees, and system-wide in-service programs.

The rationale for this study originated with the idea that in-service programs that incorporated cooperative learning (teachers teaching teachers) would be perceived more positively than the traditional one-shot, top-down approach most frequently used, and thus be more effective in producing the improvement-in-practice necessary to promote student achievement. The purpose of this investigation was to examine the effect of cooperative learning

on attitude toward in-service programs for biology and chemistry teachers in Knox County, Tennessee.

A review of the literature revealed that much public attention has been drawn to our educational system in the last decade. Reformers have promoted diagnoses and prescriptions primarily concerned with correcting curricular deficiencies. Teacher education programs have also been a prime target. However, for the teacher already employed, the avenues of change are limited mainly to continuing education in pursuit of an advanced degree, additional or renewal of certification, or in-service education. In-service education on the system level is usually of the traditional model. This normally does not involve teachers as participants and is not received well by the very ones whose behavior administrators are trying to influence. Peer teaching and cooperative learning among teachers have gained increasing acceptance within the profession. Using these ideas in in-service programs has met with success and enthusiasm. With proper administrative support, cooperative learning in-service programs can be utilized to achieve the goals of in-service: ongoing staff development and consequent student achievement.

Summary of Procedures

There were two populations studied: all of the biology teachers and all of the chemistry teachers in the Knox County School System. The treatment consisted of a series of cooperative learning in-service programs for each population. Teachers were voluntary participants in any or all of the programs.

Pre/post-treatment surveys were taken from both populations. The data analysis was accomplished through the use of the SAS computer program with means and standard deviations as the primary analysis tools. An open-ended response section provided subjective teacher opinions.

Summary of Findings

H_1--Teachers (biology and chemistry combined) who participated in the cooperative in-service program showed a gain in positive attitude toward in-service programs. The means for all 10 statements showed gains in positive attitude from the pre-treatment survey to the post-treatment survey for those participating (see Figure 1). All of the 10 statements (except 4 and 5) showed means separated by more than one standard deviation from each mean (see Figure 2). For non-participants, the pre/post-treatment mean pairs were nearly identical, falling well within the band width of one standard deviation from either mean (see Figure 4). This indicates that non-participants' attitude toward in-service did not change during the year of the treatment. A comparison of the post-treatment scores of the participants and non-participants (Figure 5) shows the effect on gain in positive attitude most clearly. Participant means were higher for every statement with the pairs of means separated by more than one band width of standard deviations from each mean for all statements except 4 and 5 (see Figure 6). These two statements' pairs of means were separated by one band width of standard deviation from either mean.

H_2--Biology participants in the cooperative learning in-service program showed a gain in positive attitude toward in-service programs. The means for all 10 statements showed gains in positive attitude from the pre-treatment survey to the post-treatment survey for those participating (see Figure 7). All of the 10 statements (except 4 and 5) showed means separated by more than one standard deviation from each mean (see Figure 8). For biology non-participants, the mean pairs were once again nearly identical, falling well within the band width of one standard deviation from either mean (see Figure 10). This indicates no change in attitude toward in-service for non-participants during the treatment period. Again, a comparison of the post-treatment means of the participants and the non-participants demonstrates the positive gains attained by the participants (see Figure 11). Participant means were higher for every statement. The band widths of standard deviations from each mean intersected its corresponding mean for only statement 4 (see Figure 12). Statement 10 was exactly on the border of the standard deviations. The positive gains toward in-service demonstrated by the participants were therefore due to the treatment they received. Two typical responses to statement 11 from biology participants follow (from Appendix A): "The BUG [Biology User Group--cooperative learning program] in-service opportunities have been the best I've ever been involved in. I like the hands-on activities, the sharing of ideas, and the fellowship with other local biology teachers. For the first time I feel a tie with other teachers in the system." "I have gained more from BUG than from any in-service program over the past four years.

The sessions are informative and have provided me with new ideas and activities that will motivate my students."

H_3--Chemistry participants in the cooperative learning in-service program showed a gain in positive attitude toward in-service programs. The means for all 10 statements showed gains in positive attitude from the pre-treatment survey to the post-treatment survey for those participating (see Figure 13). Again, all 10 statements (except 4 and 5) showed means separated by more than one standard deviation from each mean (see Figure 14). For non-participants, the means proved to be very close, all pairs falling well within one standard deviation from either mean (see Figure 16). Comparing the post-treatment means of the participants and non-participants reveals that the participant means exceeded the non-participant means on every statement (see Figure 17). Also, each pair of means was separated by more than one band width of standard deviation from each mean, except for statement 5 (see Figure 18). The means of statement 5 were separated by one band width from either mean, however. With no change evident for non-participants, the positive gains in attitude of the participants are attributed to the cooperative learning treatment. Two typical responses to statement 11 from chemistry participants follow (see Appendix B): "This is the most worthwhile type of in-service activity I have been involved in. I feel that this type of program promotes professional sharing and development. I have gained so much and used a lot of it in my classes. This type of program is so worthwhile it must be continued. This activity is the reason for in-service." "Knox County in-services

are a waste of time. CHUG [Chemistry Users' Group--cooperative learning program] has been very helpful, encouraging and insightful. It would be nice to see CHUG replace some of the in-service hours required for Knox County."

H_4--Biology participants with 10 or less years experience did not show a greater gain in positive attitude toward in-service programs than biology participants with more than 10 years experience. In fact, 9 of 10 means for the more experienced participants exceeded those of the less experienced participants. However, all pairs of means fell within one standard deviation from either mean, indicating that although both groups exhibited large gains in positive attitude toward the cooperative learning program, little difference in attitude toward the program existed between the groups (see Figures 19 and 20).

H_5--Chemistry participants with 10 or less years experience did not show a greater gain in positive attitude toward in-service programs than chemistry participants with more than 10 years experience. Figure 12 shows that the means were nearly evenly divided between the two groups (five greater for the less experienced, four greater for the more experienced, and one tie). Again, all pairs of means fell well within one standard deviation of either mean, proving little difference in attitude toward the cooperative learning program existing between the two groups even though both groups showed large gains in positive attitude (see Figure 22).

Conclusions, Implications and Recommendations

Based on the findings of this study, a number of conclusions, implications and recommendations can be made. These are stated as follows:

1. Many leading educators are overlooking an obvious method of improving staff development. By encouraging and providing for a cooperative learning in-service program, a school system could greatly improve teacher attitude toward in-service. Improved attitudes will result in desired behaviors in the profession.

2. Regardless of how many years spent in the classroom, cooperative learning in-service can appeal to and benefit teachers.

3. Through cooperative learning, the teacher becomes an active learner. This experience allows the teacher to become a positive role model for students.

4. Oak Ridge City Schools system does have a built-in in-service time as part of their weekly schedule. Every Wednesday, students are dismissed at 1:30 so that teachers can have in-service. However, this system has only one high school. Teachers, although they have the opportunity to exchange ideas, are limited by the number of colleagues. In order for cooperative learning in-service to work, groups of 6 to 12 are needed to promote sharing, support, and fresh ideas. The members of these groups need not be constant.

5. Smaller systems could benefit from cooperative learning in-services by coordinating meetings with neighboring systems.

6. In-service should be done with teachers as active, voluntary participants, responsible for their own growth as professionals. This leads to autonomy and a sense of career ownership. Resistance to traditional in-service programs is largely due to the passive role teachers are forced to adopt.

7. An added benefit of allowing teachers to be responsible for their own growth by cooperative learning is the cost to the system. The six in-service programs (three for biology, three for chemistry) cost the Knox County Schools nothing.

8. Teachers were willing and eager to share their knowledge and learn with their colleagues, especially for the practical aspects of teaching their subject. The isolationism of the individual teacher is eliminated. Cooperative learning that is discipline-specific provides a non-threatening atmosphere where this is possible.

9. System-wide cooperative learning in-service programs can only exist under non-competitive circumstances. Current trends towards a voucher system in which schools would compete for students would be detrimental to the collegiality developed by cooperative learning.

BIBLIOGRAPHY

BIBLIOGRAPHY

Alfonson, R., & Goldsberry, L. (1982). Colleagueship in supervision. In T. Sergiovanni (Ed.), Supervision of Teaching, ASCD 1982 Yearbook (p. 101). Alexandria, VA: Association for Curriculum and Development.

Alliance for Undergraduate Education. (1991). The freshman year in science and engineering: Old problems, new perspectives for research universities (pp. 31-32, 37-41). University Park, PA: Author.

American Association for the Advancement of Science. (1989). Science for All Americans (Project 2061). Washington, D.C.: Author

Bellon, J. J., Bellon, E. C., & M. A. Blank. (1991). Teaching from a research knowledge base: A development and renewal process. Columbus, OH: Macmillan.

Bloom, D., & Jorde-Bloom, P. (1987). The Role of Higher Education in Fostering the Personal Development of Teachers. Paper presented at the World Assembly of the International Council of Education for Teaching (34th), Eindhoven, Netherlands. (ERIC Document Reproduction Service No. ED 286 836).

Brandt, R. S. (1987). Learning with and from one another. Educational Leadership, 44(5), 3-8.

Bruner, J. S. (1962). On Knowing: Essays for the Left Hand. Cambridge, MA: Belknap Press.

Champagne, D. W. (1980). Does staff development do any good? Educational Leadership, 37(5), 400-403.

Dillon-Peterson, B. (1986). Trusting teachers to know what's good for them. In K. Zumwalt (Ed.), Improving Teaching, 1986 ASCD Yearbook (29-35). Alexandria, VA: Association for Curriculum and Development.

Education Commission of the States. (1983). Action for Excellence: A Comprehensive Plan to Improve Our Schools. Denver, CO: Author.

Elam, S. M., Cramer, J., & Brodinsky, B. (1986). AASA Critical Issues Reports. Staff Development: Problems and Solutions. Arlington, VA: American Association of School Administrators.

Ellis, M. G., & M. A. Obermiller. (1988). Staff Development Planning That Works. (ERIC Document Reproduction Service No. 315 388).

Evans, T. P. (1987). Guidelines for effective science teacher inservice programs. In B. Spector (Ed.), A Guide to Inservice Education: Research into Practice. 1986 AETS Yearbook (pp. 13-56). Columbus, OH: Association for the Education of Teachers in Science.

Garmston, R. J. (1987). How administrators support peer coaching. Educational Leadership, 47(5), 18-26.

Glatthorn, A. (1987). Cooperative professional development: Peer-centered options for teacher growth. Educational Leadership, 45(3), pp. 31-35.

Good, Carter (Ed.). (1973). Dictionary of Education. Third ed. New York: McGraw-Hill.

Goodlad, J. T. (1984). A Place Called School. New York: McGraw-Hill.

Guerrero, F., Schoener, J., Eisler, J., & DeSalvio, M. (1989). A Potpourri of Staff Development Practices: What Works/What Doesn't. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Services No. ED 311 564).

Harper, G. (1988). Collegial Modeling in a School Setting. Paper presented at the 13th Annual Conference of the National Council of States on Inservice Education, New Orleans, LA. (ERIC Document Reproduction Services No. ED 312 252).

Harris, B. M. (1989). In-service Education for Staff Development. Boston: Allyn & Bacon.

Holmes Group (The). (1986). Tomorrow's Teachers: A Report of the Holmes Group. East Lansing, MI: The Holmes Group, Inc.

Howey, K. R., & Gardner, W. E. (1983). Teacher education: An overview. In K. R. Howey & W. E. Gardner (Eds.), The Education of Teachers: A Look Ahead (pp. 6-37). New York: Longman.

Johnson, D. W., & Johnson, F. P. (1975). Learning Together and Alone. Englewood Cliffs, NJ: Prentice-Hall.

Johnson, D. W., & Johnson, F. P. (1981). Effects of cooperative and individualistic learning experiences on inter-ethnic interactions. Journal of Educational Psychology, 73(3), 441-449.

Joyce, B., & Showers, B. (1988). Student Achievement Through Staff Development. New York and London: Longman.

Kennedy, M. (1991). Policy issues in teacher education. Phi Delta Kappan, 72(9), 659-665.

Kyle, W. C., & Sedotti, M. A. (1987). The evaluation of staff development: A process, not an event. In B. S. Spector (Ed.), A Guide to Inservice Education: Research into Practice. 1986 AETS Yearbook (pp. 13-56). Columbus, OH: Association for the Education of Teachers in Science.

Lambert, L. (1989). The end of an era of staff development. Educational Leadership, 45(12), 78-81.

Lawrence, G. (1974). Patterns of Effective In-service Education: A State of the Art Summary of Research on Materials Procedures for Changing Teacher Behaviors in In-service Education. (ERIC Document Reproduction Service No. ED 176 424).

Lieberman, A. L., & Miller, L. (1981). Synthesis of research on improving schools. Educational Leadership, 38(4), 583-586.

Maeroff, G. L. (1988). Blueprint for empowering teachers. Phi Delta Kappan, 69(7), 472-477.

McLaughlin, M., & Marsh, D. (1979). Staff development and school change. In A. Lieberman & L. Miller (Eds.), Staff Development: New Demands, New Realities, New Perspectives (pp. 69-94). New York: Teachers College Press.

National Clearinghouse for Bilingual Education. (1987). Innovative Staff Development Approaches. New Focus, NCBE Occasional Papers in Bilingual Education, No. 4. Washington, D.C.: Office of Bilingual Education and Minority Languages Affairs. (ERIC Document Reproduction Service No. ED 296-584).

National Commission on Excellence in Education. (1983). A Nation at Risk. Washington, D.C.: Author.

National Science Board. (1983). Educating Americans for the 21st Century. Washington, D.C.: Author.

New York State School Boards Association. (1988). Staff Development: Catalyst for Change. New York: Author.

Paquette, M. (1987). Voluntary Collegial Support Groups for Teachers. Educational Leadership, 45(3), 36-40.

Rodriguez, S., & Johnstone, K. (1986). Staff development through a collegial support group model. In K. Zumwalt (Ed.), Improving Teaching, 1986 ASCD Yearbook (87-89). Alexandria, VA: Association for the Supervision of Curriculum and Development.

Schubert, W. (1986). Curriculum: Perspective, Paradigm, and Possibility. New York: Macmillan.

Sparks, G. M. (1985). Synthesis of research on staff development for effective teaching. Educational Leadership, 41(4), 65-72.

Spector, B. S. (1987). Overview: Meeting the needs of science teachers for continuing education. In B. Spector (Ed.), A Guide to Inservice Education: Research into Practice. 1986 AETS Yearbook (pp. 1-12). Columbus, OH: Association for the Education of Teachers in Science.

Swan, E., Carnes, J., & Gilman, D. A. (1988). The Effects of Teachers Teaching Others, An Indiana Staff Development Model, on Educator Attitudes and Beliefs. Paper presented at the Annual Conference of the American Association of School Administrators, Las Vegas, NV. (ERIC Document Reproduction Service No. ED 291 743).

Tishler, A. G., & Nichols, S. H. (1989). Teacher Preference for Peer Assistance Inservice Education. Paper presented at the annual meeting of the Mid-South Educational Research Association, Little Rock, AR. (ERIC Document Reproduction Service No. ED 314 410).

Van Cleaf, D. W., & Reinhartz, J. (1984). Perceivers and non-perceivers: Adaptation through in-service. Clearinghouse, 58(4), 167-170.

Westcott, D. (1987). Getting results from a one-day in-service program. Principal, 66(5), 29-30.

Wildman, T. M., & Niles, J. A. (1987). Essentials of professional growth. Educational Leadership, 44(5), 4-11.

Wood, F. H., & Thompson, S. R. (1980). Guidelines for better staff development. Educational Leadership, 37(5), 374-378.

Zigarmi, P., Betz, L., & Jensen, D. (1977). Teachers' preferences in perceptions of in-service. Educational Leadership, 34(7), 550.

APPENDICES

APPENDIX A

BIOLOGY PARTICIPANTS' COMMENTS

POST-TREATMENT SURVEY (N = 15)

Positive Comments

Each meeting of the Biology Users' Group has provided me with new ideas to use in my classroom. All the sessions have not only been interesting but very useful. I now have a file--of (1) different lectures, (2) demonstrations, and (3) labs. Besides the new academic ideas--even in socializing--one gathers new ideas to use in the classroom. A main advantage of is - it (BUG) pertains directly to our subject--and not so generalized information (that) cannot be used. BUG is great!!!

I must say I gained a lot from my in-service experiences in BUG. I feel teachers need to get together and share information/demos, etc. This is a great idea! Let's continue!

In-services which deal with usable (in the classroom) materials and that which can be used with students' problems are much better than those chosen by supervisors or directed by Central Office. I also get good ideas for bulletin boards and other things for my room by visiting other rooms (during the BUG meetings).

User groups have been wonderful. They have been extremely beneficial where demonstrations are concerned. Small group inservice provides the opportunity to get to know fellow science teachers and new ideas can be shared, frustrations can be shared, and suggestions offered from more experienced teachers. They are great--hope they continue.

I have gained more from BUG than from any in-service program over the past 4 years. The sessions are informative and have provided me with new ideas and activities that will motivate my students.

The BUG inservice opportunities have been the best inservice programs I've ever been involved in. I like the hands on activities, the sharing of ideas, and the fellowship with other local biology teachers. For the first time I feel a tie with other teachers in the system.

I enjoyed the one inservice I attended. I learned some new techniques for teaching. Also I found the support of fellow teachers was encouraging.

I really did enjoy and benefit from the BUG meeting that I attended at Bearden. I really got a lot of good, useful information and ideas that I can use with my students. In contrast, most of the scheduled (traditional) inservice meetings that I have attended in the past were usually a waste of time.

Inservice for the last year has been helpful. It is good to see and hear what other teachers in science do in their classes. Likewise, useful activities are always welcomed.

In attending BUG - I thought it was great. Very good to communicate with other teachers in this manner.

The small informal BUG meetings are helpful. Wish they could be on regular inservice day(s). Regular inservice meetings are sometimes helpful (ex. textbook analysis). Most are long and boring - need smaller groups by subjects taught.

Extremely effective means of inservice. One idea leads to another until it was an excellent way to share techniques and ideas. All presentations were useful because you had the expertise of a teacher that had been successful.

Negative Comments

None was given.

APPENDIX B

CHEMISTRY PARTICIPANTS' COMMENTS

POST-TREATMENT SURVEY N = 14

Positive Comments

This is the most worthwhile type of in-service activity I have been involved in. I feel this type of program promotes professional sharing and development. I have gained so much and used a lot of it in my classes. This type of program is so worthwhile it must be continued. This activity is the reason for in-service.

I really appreciate the in-service time and the experience of the Chemistry Users' Group.

The Chem-Users' Group in-service activities have been very beneficial to me as a new teacher. I have been exposed to various teaching techniques. The other teachers have provided me with demonstrations, labs, and helpful hints that greatly facilitated my work this first year.

Knox County inservices are a waste of time. CHUG (the Chemistry Users' Group) has been very helpful, encouraging, and insightful. It would be nice to see CHUG replace some of the inservice hours that are required for Knox County.

I enjoyed the inservice program that year at South-Young last year. I am sorry that I did not get to attend the last meeting due to prior commitments. I was glad to exchange some ideas with the teachers that attended and I have used some of the things I picked up in the inservice in class.

I feel the User Group Inservice has benefitted me in several ways:

1. This group has given me many useful ideas for my Chemistry classes!
2. This time allows me to talk with other Chemistry teachers about common problems/pressures directly related to my teaching.
3. I, in turn, can share useful demonstrations, labs, with other teachers.
4. I think this group is especially helpful for new or beginning teachers. They have so many questions to ask and most are willing to help if given the opportunity.

5. Finally, it's the people that make it special. I appreciate the relaxed but professional atmosphere in which participation is encouraged. We have fun as we learn and share. Thanks!

Chemistry Users' In-Service was by far one of the best I've been to.

I was able to pick up some tips on presentation and teaching techniques. One of the most positive aspects was talking with other Chemistry teachers.

I think these inservice programs which you have developed are the answer to a need. When all the science teachers get together, we tend to stay in our own school clique. However, a meeting of just Chemistry teachers lets us get to know each other and share common problems and ideas. Both have their place but we need more of the latter type. From just the one meeting I attended, I picked up a lab tip and redesigned a lab around it. I was very pleased with the results. I'm afraid I tend (to not pay attention) at general meetings. Hopefully we can have another chem. meeting during before-school-inservice to learn to use the software coming with the new books.

This type of inservice definitely needs to be expanded.

Negative Comments

Not well organized.

APPENDIX C

BIOLOGY TEACHERS' COMMENTS

PRE-TREATMENT SURVEY N=30

Occasionally in-service presents something useful, but most of the time the programs are very general. If everyone meets together it is difficult to have a program to meet everyone's needs, so I guess that is the reason we have general topics, such as safety, chemical disposition, etc. We accomplish more when we have departmental meetings.

Since we have been allowed to do our science in-service at our own schools, it has been much more beneficial. I think perhaps if teachers were allowed to select the in-service programs, they would be of more use to us.

The in-service activities at our school were necessary. However, (chemical) inventory does not help me become a better teacher. Now, I do know more about chemical hazards and what materials OSHA requires schools to have available, etc. But I did not get anything I could use in my classroom.

I did attend workshops on my own and I do bring those lessons and information back to the classroom, but it was not system sponsored in-service. (These included:)

T. I. E. Workshop
TN Tech Chemical Demonstration Workshop
UT and Environmental Workshop

Lacking in content. The inservices that have meant the most to me were: Project Wild at UT, Non-science workshops at the Teacher Center.

The most useful inservice program involved staying in our base schools and working together as a department. We worked on chemical storage and organization, and we shared useful ideas to utilize in our classroom (this school year 1989-90). The others have been boring and a waste of time. I have received a little useful material over the last 5 years--but not enough.

During the past year it seems that most in-service meetings have been geared toward understanding the resource and/or handicapped students (those planned by principals). However, on a system-wide basis, time given to work in schools has been most helpful.

Over the past year they have been almost nonexistent. Does a program (science-oriented, sensitive to the needs of County science teachers) exist?

The in-service at Bearden in October (1989, ETEA) was science oriented, but I don't feel that a lot of teachers got a lot out of it. Those who are "in touch" with science education probably found it relevant. Those who haven't upgraded probably didn't (get) much out of it.

I would like to see more practical things like demonstrations, materials, methods, etc. type of labs. An in-service in which teachers exchange with each other would be much more useful.

The individual school in-service meetings that we have had during this year have been the most helpful that we have ever had. They allowed use to get organized within our departments and to work together within a familiar group. I feel that these sessions were very productive and that we should continue to have in-school in-services.

Most Knox County in-service that I have attended have not been very helpful. Workshops that I have attended out of town and out of state have been more helpful.

The number of required in-services has decreased. This is positive as it allows more time for teachers to work on their needed curricula and misc. (rooms, bulletin boards, etc.).

This is much needed time.

From in-service experiences so far (19 years) even the better quality ones did not do much to influence my curriculum (they were not designed to). These were simply less "painful" to sit through than others.

Too often in-services fall on or before the day that 6 weeks or semester grades are due. Takes away from creative curriculum improvement time.

Very few of the county-wide in-service or school in-service programs have been beneficial.

They are usually a time filler.

The best in-service meetings I have attended in Knox County were the ones we held at our schools, within our own department. I have gotten more done at these meetings than I have at any of the general meetings held for all the science teachers in Knox County.

No interrelation with other schools, no sharing, etc.

In the years [demographic data indicates 11-20 years] I have been in the system, 2 good activities have been presented; Computer and CPR.

The city-wide meetings have been boring and generally useless--the departmental meetings are very focused on one topic and must be done in a very limited timeframe.

Our in-service consisted of departmental meetings at our own school, which I found to be very beneficial for me as a teacher. From these meetings I was able to discuss various methods of teaching, on a more personal basis. I gained a certain feeling of confidence within our science department. I feel as a department we explored many options that possibly would not have been discussed had there been system-wide meetings.

My best learning experiences have come from the unscheduled in-service required by the county. I like the freedom to choose my training--since I know what my students need best.

No comment.

The school in-services by the department are good. It's the system-wide in-service that needs to be changed. They're terrible! They need to be broken down by subject matter--focus on teaching techniques and current events happening in the particular field. Also, it would be nice for the in-services to provide teaching materials teachers can use.
I know they do it in other departments! What's the deal!!!

The in-service on chemicals was useful to science teachers. We were also allowed to work in our school on 2 in-service days, which were of great help in the department organization.

Most in-service this year was constructive but not enriching. In past years they have been somewhat useless. We do have some choices for alternatives which are very constructive.

APPENDIX D

CHEMISTRY TEACHERS' COMMENTS

PRE-TREATMENT SURVEY N=20

Present in-service has not met my personal needs as a science teacher in the last 3-5 years. There is some improvement but not much.

The in-service programs where we exchanged ideas were very good. The programs prepared by the science teachers at my school and presented to each other were excellent. Usually, I am looking for painless hours.

In-service time given to complete "in-house" duties such as chemical inventories, etc. were worthwhile and appreciated. I don't think I need another stress management in-service.

There have been very few ideas that I have taken back to the classroom that have helped my students.

Necessary information which could have been handled in less in-service time was divided into many longer than necessary sessions.

Very little of the in-service information was directly applicable to my classroom. Safety and Chemical Hazards information are needed but there must be a better way.

There have been few in-service activities which have been memorable. I have appreciated being given time in school to do the required inventories, etc. This has been the most useful idea.

The only science in-service I have been involved in . . . is the NSTA science teachers' luncheon in Atlanta. Atlanta was disappointing.

In the past, total, complete waste of time. This year, however, small departmental meetings in school have been more beneficial than ever before. When you sit in a program that you think is a waste of time, it adds to the frustration.

Busy work.

In-service is a total waste of time. I would much rather spend my time in my school doing what I need to do. They never give us any classroom time.

Over the past year I participated in the NSTA convention in Atlanta. I found much of it to be both useful and educational.

They have been a waste of time!

In-service over the pst year has been disappointing. It has personally helped me very little. In-service should be specific for the discipline--it should include new teaching methods, activities, and materials for teaching the specific activity.

There have been few if any this year by Knox County. In the past for the most part they have been a complete waste of time.

A method supervision has devised to block the individuality and ability of teachers. A method to prevent teachers from having planning time.

APPENDIX E

BIOLOGY NON-PARTICIPANTS' COMMENTS

POST-TREATMENT SURVEY N=26

Positive Comments

None was given.

Neutral Comments

1. Moderate usefulness.
2. Moderate interest.
3. Time could be better spent in the classroom or in departmental meetings.
4. Have often wondered why they're not better.

Many of the in-service activities seem to be a time-killing activity simply because we have to. The most useful inservice that we have had in several years was an in-school in-service.

Informative--in that topics are covered which we need to know, but most of these topics could have been covered in a memo to department chairs.

In-service over the past 20 years has varied greatly with the average (in my estimation of about 1 good one that was directly useful to me out of 10--10% good to very good).

There have been many that were directed toward new teachers that, I am sure, were helpful to them.

Content has improved. Appropriate settings, time for further discussion, question/answer has not.

Some were useful. The ones held in our department were most useful to our interests. Those school or country-wide were much less useful--only fulfilled requirement of having them.

Negative Comments

I am not sure if in-service is directed toward the needs of teachers or not. I have not heard needs voiced. So far I have heard one good in-service speaker but none of the topics have related to my needs. This is my first year teaching.

There is not enough teacher interaction.

Textbook evaluation--poor--hard to follow--poor setup. No classroom benefit.

I want knowledge in in-service.

Total waste of time and energy!

For the most part it is a waste of professional time. The things scheduled could be done in less than half the time spent.

Need to better disseminate information concerning opportunities for unscheduled in-service that would be of value to science teachers. For example, TVA, ORNL, etc.

Not good!

Another completely baffling point is the system's reluctance or inability to use the resources available at UTK. Teachers in our system, as is true for all types of professional growth, find no help, no provision, no consideration. . .

Too long. Too bad. Too sad.

I have not been very impressed with my in-service activities. I feel that the only areas that it has helped are my classroom management and organizational skills. I would like to see more in-services focused on the students and how I can reach the learning needs of each individual. I have heard so many positive things about BUG. Due to scheduling conflicts, I have not had the opportunity to attend. I plan to in the future.

Our in-services have focused on a series of workshops that sound great in theory but are very difficult to put into practice. As a first year teacher I don't feel like our in-services have addressed very well the specific problems and needs of teachers at this location, let alone special needs of new teachers to the Knox County System.

APPENDIX F

CHEMISTRY NON-PARTICIPANTS' COMMENTS

POST-TREATMENT SURVEY N = 4

Positive Comments

None was given.

Neutral Comments

1. I have done some hours of in-service that were totally irrelevant to anything to do with teaching because there was nothing else to do.
2. Most large group meetings contain information for a few and little for all.
3. When the meetings had to do with specific subjects or topics, a lot was learned and more important, everyone enjoyed doing it.
4. I believe in-service is a punishment to all because a few would not do what they were supposed to do on their own. Recall: in-service 20 years ago vs. in-service today!!

Negative Comments

In-service programs seem designed to meet one need--the state requirement that teachers be in in-service a specified number of days or they won't pay them.

APPENDIX G

PRE/POST TREATMENT, COVER LETTERS AND SURVEYS

Dear Teacher,

I am conducting this research on teachers' current attitudes toward science in-service programs as part of my dissertation study. Your participation in this project is, of course, voluntary, and your help will be greatly appreciated. Your personal anonymity will be maintained. Your return of this survey will be considered your informed consent to participate.

Sincerely,

Robert A. Core

PRE-TREATMENT SURVEY

I. Demographic Information: Please check the appropriate response for each item below.

1. Teaching experience (yrs): 1)___0-3; 2)___4-10;
   3)___11-20; 4)___20+

2. Gender: 1)___Female; 2)___Male

3. Age: 1)___<30; 2)___30-39; 3)___40-49; 4)___>49

4. Highest degree earned:
   1) ___Bachelor's
   2) ___Master's
   3) ___Master's +30
   4) ___Ed.S.
   5) ___Ed.D./Ph.D.

5. Area(s) of certification:
   1) ___General Science
   2) ___Biology
   3) ___Chemistry
   4) ___Physics
   5) ___Other (please specify)

6. Estimated number of semester hours in science: ___
   (Semester Hours = 2/3 x Quarter Hours)

7. In-service program now attending:
   1) ___Biology
   2) ___Chemistry

Please proceed to the next page.

PRE/POST-TREATMENT SURVEY

II. Please answer the following according to your present attitude toward science in-service programs. In-service includes all general group and departmental meetings in science as provided by the Knox County School System. The following responses indicate a continuum with 1 = strongly disagree to 6 = strongly agree. Please indicate your choice by circling.

	SD SA
1. In-service activities provide opportunities to become acquainted with new teaching techniques/innovations.	1 2 3 4 5 6
2. In-service programs include a variety of activities which allow for different interests and needs that exist on the part of individual teachers.	1 2 3 4 5 6
3. In-service education results in the improvement of classroom performance.	1 2 3 4 5 6
4. In-service programs are based on specific objectives.	1 2 3 4 5 6
5. In-service education includes special activities to orient new teachers to the system.	1 2 3 4 5 6
6. In-service education helps the teacher to become more sensitive to what is happening in his/her classroom.	1 2 3 4 5 6
7. In-service programs arise from a study of the needs and problems of the teachers.	1 2 3 4 5 6
8. In-service activities are designed around the common needs of the teachers.	1 2 3 4 5 6
9. In-service education helps improve relationships among teachers.	1 2 3 4 5 6
10. Teachers have the major say in determining what their in-service education is.	1 2 3 4 5 6
11. On the back, briefly summarize your feelings about your in-service experiences over the last year.	

Spring, 1991

Dear Teacher,

I am conducting research on teachers' current attitudes toward science in-service programs as part of my dissertation study. Your participation in this project is, of course, voluntary, and your help will be greatly appreciated. Your personal anonymity will be maintained. Your return of this survey will be considered your informed consent to participate.

The purpose of the study is to compare traditional in-service to the Biology User Group and Chemistry User Group in-services. If you have attended any of the User Group in-service programs, please answer the survey based upon User Group experiences only. If you did not attend base your responses on your normal in-service experiences of the past year.

Question 7 of the Demographic Information will enable me to differentiate between those who have attended User Group sessions and those who have not. My records have indicated your attendance. I have marked Question 7 accordingly.

Please return the 2 pages of the survey to me (Bob Core, South-Young High) in the enclosed envelope by school mail.

Thank you very much.

Sincerely,

Robert A. Core
South-Young High

POST-TREATMENT SURVEY

I. Demographic Information: Please check the appropriate response for each item below.

1. Teaching experience (yrs): 1)___0-3; 2)___4-10; 3)___11-20; 4)___20+

2. Gender: 1)___Female; 2)___Male

3. Age: 1)___<30; 2)___30-39; 3)___40-49; 4)___>49

4. Highest degree earned:
   1) ___Bachelor's
   2) ___Master's
   3) ___Master's +30
   4) ___Ed.S.
   5) ___Ed.D./Ph.D.

5. Area(s) of certification: (in science)
   1) ___General Science
   2) ___Biology
   3) ___Chemistry
   4) ___Physics
   5) ___Other (please specify)

6. Estimated number of semester hours in science: ___
   (Semester Hours = 2/3 x Quarter Hours)

7. Total number of Biology User Group In-services attended:
   0) ___
   1) ___
   2) ___
   3) ___

Please proceed to the next page.

PRE/POST-TREATMENT SURVEY

II. Please answer the following according to your present attitude toward science in-service programs. In-service includes all general group and departmental meetings in science as provided by the Knox County School System. The following responses indicate a continuum with 1 = strongly disagree to 6 = strongly agree. Please indicate your choice by circling.

	SD SA
1. In-service activities provide opportunities to become acquainted with new teaching techniques/innovations.	1 2 3 4 5 6
2. In-service programs include a variety of activities which allow for different interests and needs that exist on the part of individual teachers.	1 2 3 4 5 6
3. In-service education results in the improvement of classroom performance.	1 2 3 4 5 6
4. In-service programs are based on specific objectives.	1 2 3 4 5 6
5. In-service education includes special activities to orient new teachers to the system.	1 2 3 4 5 6
6. In-service education helps the teacher to become more sensitive to what is happening in his/her classroom.	1 2 3 4 5 6
7. In-service programs arise from a study of the needs and problems of the teachers.	1 2 3 4 5 6
8. In-service activities are designed around the common needs of the teachers.	1 2 3 4 5 6
9. In-service education helps improve relationships among teachers.	1 2 3 4 5 6
10. Teachers have the major say in determining what their in-service education is.	1 2 3 4 5 6
11. On the back, briefly summarize your feelings about your in-service experiences over the last year.	

APPENDIX H

CORRESPONDENCE

South Dakota State University
Box 2220
Brookings, SD 57007-0095

Division of Education
(605) 688-4196

February 7, 1990

Robert A. Core
Graduate Student
Ph.D., Science Education
The University of Tennessee-Knoxville
301 Claxton Education Building
Knoxville, Tennessee 37996-3400

Dear Mr. Core:

Thank you for your recent letter inquiring about my In-Service Inventory.

Enclosed you will find the materials you requested.

If I may be of additional help, please feel free to contact me.

Sincerely,

Darrell Jensen, Dean
College of Education and Counseling

ddg

ENCLOSURE

Knox County
Department of Public Instruction
EARL F. HOFFMEISTER, SUPERINTENDENT

April 4, 1990

University of Tennessee
The Office of the Vice Provost for Research
Knoxville, Tennessee 37916

TO WHOM IT MAY CONCERN:

Robert A. Core, South Young High School, has the permission of the Knox County School System to conduct science in-service programs, as a part of unscheduled in-service, and to survey teachers with respect to attitudes toward science in-service programs.

Sincerely,

B. G. Chambers

Bob G. Chambers
Science Coordinator

400 West Main Avenue, P.O. Box 2188, Knoxville, TN. 37901-2188 (615) 521-2415

Robert A. Core
South-Young High School
3900 Decatur Road
Knoxville, TN 37920
January 2, 1990

Dear

I would like to announce the opportunity for a different type of in-service. With the approval and encouragement of Mr. Bob Chambers and the cooperation of the Science Education Department of the University of Tennessee, this program will probably begin in February, 1990.

The emphasis for this in-service will be teachers teaching teachers. Your group will be restricted to chemistry teachers. The success of this endeavor will be directly dependent upon your involvement.

A typical evening program (counts for 2 hours in-service credit) would consist of five or six teachers each giving a five to ten minute presentation on a concept, or demonstrating a part of a favorite lesson, or a lab technique--something that you know works for you and from which others could benefit. Also, if time permits, a speaker of interest (college, industry, government) may deliver a short address.

Are you interested? Do you have something to contribute? Please fill out the form below, detach and return to me (Bob Core, South-Young High) via school mail. Depending upon the response, a letter with details of the first meeting will be sent to you in January.

Sincerely,

Robert A. Core

C

NAME _____ SCHOOL _____

PHONE NUMBER _____ BEST TIME TO CALL _____

____I am interested in attending.
____I have something I would like to present.

PURPOSE

I am promoting this in-service for two reasons:

1. While doing laboratory safety inspections in the schools last year, I spoke to many teachers and learned many things that I have since used in my own classroom. What opportunity has anyone else had to do this? I know that each of us could make the rest better at what we do.

2. If the response is great enough, I may attempt to use the in-service as a basis for a dissertation. You may be asked to participate in attitudinal surveys.

Regardless, I see a need for the chance to talk and learn with other teachers--something that I don't get to do very often.

Robert A. Core
South-Young High School
3900 Decatur Road
Knoxville, TN 37920
February 6, 1990

Dear

Sixteen Biology teachers have so far indicated a desire in attending the in-service as described to you earlier. I believe this indicates sufficient interest to proceed with the second part of the plan--which is to go ahead and set up an initial meeting time. Since I am organizing this, I will arbitrarily choose a time and a place, but it is my desire that after the first meeting, the group will decide on a future site/time. The first meeting will be

March 15, 1990
Thursday
7:00-9:00 P.M.
South-Young High
Room 206

The following people will be presenting:

--
--
--
--
--
--

If you need special equipment (we will have access to a lab area) or handouts run off, please contact me. Presentations should probably be 10-15 minutes, but we can be flexible.

I am looking forward to seeing you.

Sincerely,

Bob Core

Robert A. Core
South-Young High
3/5/90

Dear

The time approaches. The in-service will take place:

March 15, Thursday
7:00-9:00 p.m.
South-Young High
Room 206

The presenters will be:

--
--
--
--
--
--

If you need any equipment (lab facilities available), let me know. We will (hopefully) need handouts, if being used, for 15 to 20.

I have included a map--I know this school can be hard to find. Bring a biology teacher; the more the merrier.

Sincerely,

Bob Core

(map goes here)

Robert A. Core
South-Young High School
3900 Decatur Road
Knoxville, TN 37920
3/10/90

Dear

I would like to announce the opportunity for a different type of in-service. With the approval and encouragement of Mr. Bob Chambers, Science Supervisor, this program will probably commence in April of this year.

The emphasis for this in-service will be Chemistry teachers teaching Chemistry teachers. The success of this endeavor will be directly dependent upon your involvement.

A typical evening program (counts for 2 hours in-service credit) would consist of 5 or 6 teachers each giving a 5 to 10 minute presentation on a concept, lab or lab technique--something that you know works for you and from which others could benefit. Several teachers who have recently attended the TIE conference in Nashville have indicated that they have information to share.

Are you interested? Do you have something to contribute? Please fill out the form below and return to me (Bob Core, South-Young High) via school mail. Depending upon the response, a letter with details of the first meeting will be sent to you as soon as possible.

Sincerely,

Bob Core

_____ _____

NAME SCHOOL

___I am interested in attending.

___I have something I would like to present.

Bob Core
South-Young High
4/2/90

Dear Chemistry Teacher,

Here is a map which should enable you to find S-Y High for the chemistry in-service to be held:

April 19, Thursday
Room 206
7:00-9:00 p.m.

Remember, this will count for 2 hours of in-service credit of this year's 6 hour requirement. If you are planning on attending, would you please call S-Y at 579-2133 (or 34) and leave a message for me that you will be in attendance? Also, let me know if you wish to present.

I hope to see you on April 19.

Sincerely,

Bob Core

(map goes here)

Bob Core
South-Young High
9/21/90

Dear

The first meeting of the year for the Biology Users' Group (BUG) has been set for:

Bearden High School
Room 420
October 9, 1990 (Tuesday)
7:00-9:00 p.m.

Come and discuss problems and ideas with people who are intimately familiar with your situation--other Biology teachers in the Knox County system. Bring your student teacher if you have one.

Last Spring's meeting was well received. If you believe you have something to present to the group (a synopsis of your favorite lesson or lab, a technique you have used effectively in a class, etc.), please leave a message for me at 579-2133 (school) or 584-1364 (home). Please come even if you are not presenting. We hope to establish this method of in-service as a viable alternative to traditional means, and your presence will certainly help. In-service credit of 2 hours will be given to those in attendance.

We hope to see you there.

Sincerely,

Bob Core

P.S. Would you please verify that all Biology teachers at your school received this letter?

Bob Core
South-Young High
9/21/90

Dear

The first meeting of the year for the Chemistry Users' Group (CHUG) has been set for:

Bearden High School
Room 420
October 16, 1990 (Tuesday)
7:00-9:00 p.m.

Come and discuss problems and ideas with people who are intimately familiar with your situation--other Chemistry teachers in the Knox County system. Bring your student teacher if you have one.

Last Spring's meeting was well received. If you believe you have something to present to the group (a synopsis of your favorite lesson or lab, a technique you have used effectively in a class, etc.), please leave a message for me at 579-2133 (school) or 584-1364 (home). Please come even if you are not presenting. We hope to establish this method of in-service as a viable alternative to traditional means, and your presence will certainly help. In-service credit of 2 hours will be given to those in attendance.

Don't confuse this meeting with the Biology group's meeting scheduled the week before.

We hope to see you there.

Sincerely,

Bob Core

P.S. Would you please verify that all Chemistry teachers at your school received this letter?

Bob Core
S-Y High
2/11/91

Dear

The next Biology's Users' Group (BUG) will be held:

Fulton High School
Room 209
Thursday, March 7
7:00-9:00 p.m.

In-service credit of 2 hours will be given to those attending. No further meetings are scheduled for this year.

The Fall meeting went well, and many good ideas were exchanged. If you have an idea that you would like to share, would you fill out the slip below and return to me (Bob Core) by school mail? Or just call and leave a message for me at South-Young at 579-2133. Please do not feel that you must present anything. Come and enjoy the time together with others who understand your situation (reservations are not necessary). Your presence will be an encouragement to all.

_____ _____

NAME SCHOOL

_____

Idea(s) to present

_____

Any special needs or equipment

Bob Core
2/21/91

Dear Biology Teacher,

Could you see that each biology teacher in your school gets a copy of this letter? This is a reminder for the next BUG meeting:

Fulton High School
Room 209
March 7, 1991 (Thursday)
7:00-9:00 p.m.

Inservice credit of 2 hours will be given to those in attendance.

Fulton High is located near the corner of Broadway and Woodland. However, the bridge going across Woodland from Broadway is closed. Access from Broadway can be achieved by going north on Broadway (1 block past Woodland, I think) and turning left on Ogle (at the Krystal). Take the first left past Stevens' Mortuary and you should come up to the school to a parking lot near the cafeteria. Enter through the cafeteria, go to the far side through the doors and turn right down the hall to Room 209.

You can get on Woodland from Central Ave., go toward Broadway and Fulton will be the last thing on your left. Take the left fork of the driveway and park in front of the school and enter the cafeteria on the ground level.

I hope to see you there.

(map goes here)

Bob Core
2/28/91

Dear

The second meeting of the year for the Chemistry Users' Group has been set for:

Powell High School
Room 132
March 21, 1991 (Thursday
7:00-9:00 p.m.

Inservice credit of 2 hours will be given for attendance.

If you have something you would like to present--an idea that you have found useful, a better way of doing something, a new lab that your students liked--anything that could help the rest of us become a little better at what we do, would you fill out the form below and send it to me (Bob Core, South-Young High) by school mail? If you just want to come and soak up some new ideas, please attend.

Powell High is on Emory Road. Take the Emory Road exit off I-75 north. Turn left o Emory Road, go through a 4-way stop, continue on past RR tracks, and start looking for the high school on the left. I think the school is about 2-3 miles from the interstate. Enter the school at the front, and take the first hall to your left down to Room 132.

Conflicts prevented having this meeting at the original site. I hope this is not too great an inconvenience for some of you.

I would like to see this kind of inservice grow, but it will take effort. I hope to see you at Powell.

NAME _____ SCHOOL _____

Any special equipment needed? _____

KNOX COUNTY SCHOOLS

ADMINISTRATIVE BULLETIN

EARL F. HOFFMEISTER, SUPERINTENDENT

VOLUME 36, NUMBER 7, OCTOBER 1, 1990

To All Biology Teachers (Bob Core, South-Young High School)

The first meeting of the year for the Biology Users' Group (BUG) will be at Bearden High School, Room 420, October 9, 7:00-9:00 p.m. Two hours of inservice credit will be given.

VOLUME 36, NUMBER 8, OCTOBER 8, 1990

To All Chemistry Teachers (Bob Core, South-Young High School)

The first meeting of the year for the Chemistry Users' Group will be at Bearden High School, Room 420, October 16, 7:00-9:00 p.m. Two hours of inservice may be earned.

VOLUME 36, NUMBER 22, FEBRUARY 4, 1991

To All Biology Teachers (Bob Core, South-Young High School)

There will be a meeting of the Biology Users' Group (BUG) at Fulton High School, Room 209, March 7, 7:00-9:00 p.m. Two hours of in-service credit may be earned.

VOLUME 36, NUMBER 25, FEBRUARY 25, 1991

To Chemistry Teachers (Bob Core)

The second meeting of the year for the Chemistry Users' Group has been set for Powell High School, Room 132, March 21, 7:00-9:00 p.m. Inservice credit of two hours will be given for attendance.

VOLUME 36, NUMBER 26, MARCH 4, 1991

To All Biology Teachers (Robert A. Core)

Just a reminder--The Biology Users' Group (BUG) meeting will be held at Fulton High School, Room 209, March 7, 7:00-9:00 p.m. Inservice credit of 2 hours will be given for attendance.

VOLUME 36, NUMBER 28, MARCH 18, 1991

To All Chemistry Teachers (Bob Core)

REMINDER! The Chemistry Users' Group will meet at Powell High School, Room 132, March 21, 7:00-9:00 p.m. Inservice credit of 2 hours will be given.

APPENDIX I

GUIDELINES FOR UNSCHEDULED IN-SERVICE DAY

KNOX COUNTY SCHOOLS

GUIDELINES FOR UNSCHEDULED INSERVICE DAY
(6 hours)

1989 - 1990

Introduction

A plan of professional growth activities which provides for the continuing education of instructional aides, teachers, principals, and central office personnel is an essential component of the instructional program of the Knox County Schools. The inservice program is a vehicle by which the professional growth goals of the system, the school, and the individual employee may be pursued. In developing the following guidelines the major objective was the provision of increased flexibility for professional educators to plan and implement a personalized professional growth program.

Definitions and Conditions

1. "Day" and "Period". Unscheduled inservice day and inservice period are defined as follows:

   a. Unscheduled inservice day: six hours. (Scheduled inservice days are 7 hours and 45 minutes.)

   b. Inservice period: between August 16, 1989 and May 3, 1990.

2. Deadlines. All certificated personnel and instructional assistants shall complete, during the inservice period, an equivalent of one day (6 hours) of professional growth activities. The unscheduled inservice day must be recorded by May 4, 1990.

3. "UNSCHEDULED". Professional growth activities shall be done during evenings, weekends, holidays, and personal leave days. (Employees may use personal leave days to attend workshops, conferences, or for school visitations to accrue hours toward unscheduled inservice. Personal leave days may not be used in lieu of unscheduled inservice hours. Activities completed during time for which personnel are paid may not be counted toward the requirement. Paid professional leave, released time from teaching and scheduled inservice days are examples of situations for which one may not receive unscheduled inservice credit.)

4. Credit. Credit will be hour for hour unless otherwise specified in these guidelines.

5. Prior Approval. Prior approval is required for certain activities. All teachers, including itinerants, shall obtain prior approval from the principal. Principals and central office personnel shall obtain prior approval from the immediate supervisor.

Approvable Activities - ELEMENTARY

Classroom teachers will complete their required six hours of unscheduled inservice by attending sessions scheduled throughout the year by Knox County personnel. Approved topics are:

Grade K - Sharing Sessions on Selected Topics
Grade 1 - Strategies and Materials for Reading
Grade 2 - Writing and Thinking - Sharing Sessions
Grade 3 - Computers
Grade 4 - Talents Unlimited
Grade 5 - Study Skills - Communication Skills

Teachers excluded from the above grade level inservice are:

Teachers in TESA training during the 1989-90 school year*
Teachers in magnet or magnetized schools*
Special area teachers -(Music, Library, P.E., Counselors, Chapter I, Special Education)*
TAG*
Traveling Reading, Math, and Science*

*Unscheduled hours shall be earned by participation in activities approved by his/her principal or immediate supervisor.

Approvable Activities - MIDDLE and HIGH SCHOOL

The inservice requirements shall be fulfilled by participation in activities from the professional growth categories itemized below.

1. Teacher Center Sponsored Workshops - professional growth opportunities scheduled by the Teacher Center.

2. System-wide Workshops - supervisor directed or sponsored. Examples: reading and math workshops, art workshops, physical education clinics, and instructional or curriculum improvement meetings scheduled on fourth or fifth Tuesdays.

3. Area and Regional Conferences, Symposia, and Non-Credit Courses - conducted by colleges, educational consortia, or commercial educational enterprises.

4. Regional, State, and National Conferences - conducted by professional associations for curricular and/or instructional improvement or program administration. Examples: ASCD, TIRA, ACE, NSTA, NCTE, NCTM, AAHPER, NASSP, AASA, TAMS, NAESP, TAESP, etc.

5. Southern Association of Colleges and Schools - (Self-Study Committees) High School Only: Maximum credit of 6 inservice hours.

6. Independent Writing - professional published articles:

   a. Must be in state, regional, or national journal.

   b. Maximum credit of 6 inservice hours.

7. School Visitation:

   a. Must have prior approval.

   b. Maximum credit of 3 inservice hours.

8. Module Writing:

   a. Must have prior subject area supervisor approval.

   b. Writer may not be receiving other remuneration.

9. Textbook Review and Selection:

   a. Must be in conjunction with current textbook adoption cycle.

   b. Maximum credit of 6 inservice hours.

10. Consulting - serving as a consultant for local or area inservice programs:

   a. Consultant may not be receiving remuneration other than travel expenses.

   b. Maximum credit of double the presentation time. (i.e., one hour presentation = 2 hours inservice credit.)

11. Consulting - serving as a consultant for state, regional, or national conference.

   a. Consultant may not be receiving remuneration other than travel expenses.

   b. Maximum credit of 6 inservice hours.

Non-Approvable Activities

Activities and assignments which are a necessary part of the day-to-day operation of the school program are not eligible to be included in the personal professional growth program. Ineligible activities are itemized below.

1. Routine duties such as compiling class rolls, scheduling, counting texts, housekeeping chores, grading papers, marking grades, compiling registers, inventorying, etc.

2. Routine administrative faculty meetings

3. Faculty committees

4. Advisory committees

5. Functions of department chairmen

6. Routine administrative meetings called by supervisor on fourth and fifth Tuesdays

7. Work assignments for extra curricular activities such as ball games, plays, band practice, etc.

8. Club sponsorship

9. Bus duty

10. Jury duty

11. P.T.A., P.T.O., school improvement associations, and school open house

12. School board meetings

13. Field trips

14. Fairs

15. Viewing T.V. programs

16. Viewing Movies

17. Professional organizations' business meetings

18. Programs or meetings concerned with personnel benefits such as salaries, insurance, retirement, credit unions, etc.

19. Leadership responsibilities (holding office) and membership in professional organizations

20. College courses taken for credit or certification renewal

Accountability

Each certificated employee and instructional assistant shall maintain a record of professional growth activities under the direction of his/her principal or immediate supervisor. A loose-leaf notebook will be maintained in each building for recording eligible activities. It will be the employee's responsibility to record the activity immediately upon completion. All activities must occur between August 16, 1989 and May 3, 1990 and must be recorded no later than May 4, 1990.

The principal or immediate supervisor will review the notebook, initial approval of eligible activities, and verify on the approved form completed days with the Assistant Superintendent for Instruction. Personnel who have not met the requirements will have pay deducted.

Personnel employed after October 13, 1989 will not be expected to earn the (6) six hours and will not be paid for this unscheduled inservice day.

KNOX COUNTY SCHOOLS

ADMINISTRATIVE BULLETIN

EARL F. HOFFMEISTER, SUPERINTENDENT

VOLUME 36, NUMBER 30, APRIL 15, 1991

To All Certified Personnel and Instructional Aides (Patty Vittetoe)

Unscheduled Inservice Reminder: The six (6) hours of unscheduled inservice must be completed and recorded by Friday, May 3, 1991. Each principal or immediate supervisor will review the activities and verify completion on the approved form to be returned to Mrs. Simpson's office.

VITA

Robert A. Core was born in Morgantown, West Virginia, on July 30, 1946. Moving shortly thereafter to Syracuse, New York, he attended Edward Smith Elementary, T. Aaron Levy Junior High, and was graduated from William Nottingham High School in 1964. The following September he entered Syracuse University. In the spring of 1967 he transferred to The University of Tennessee, Knoxville, and graduated with a Bachelor of Science in Chemical Engineering in June, 1969.

In August, 1969, he began his career at Young High School in the Knoxville City Schools teaching science and mathematics, eventually moving to the consolidated South-Young High School in 1976. He is presently employed by the Knox County School System at the newly merged South-Doyle High School.

In June, 1970, he entered Graduate School at The University of Tennessee and received the Master of Science majoring in Curriculum and Instruction with an emphasis in science education in August, 1975.

Further graduate studies at The University of Tennessee led to his receiving the Doctor of Philosophy degree with a major in Curriculum and Instruction in August, 1991. He is a member of the American Association of Physics Teachers.

He is married to the former Sylvia Stout of Knoxville, and they are the parents of a daughter, Jennifer Catherine, and two sons, Andrew Christopher and Patrick Russell.