# THE RELATIONSHIP OF AEROSPACE EDUCATION WORKSHOPS TO PRACTICES AND ATTITUDES OF PARTICIPATING TEACHERS

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# CHAPTER I

# INTRODUCTION

## Nature of the Problem

The various definitions of in-service education in the literature seem to be in agreement that in-service education is a process for planned change. According to Harris (1963), in-service education is a major function of supervision which consists of activities which will promote the growth of instructional staff members to make them more effective and more efficient.

Harris and Bessent (1969) point out that in-service education is usually distinguished from pre-service education only by time and sequence. Blosser and Howe (1969) make the suggestion that no sharp distinction be made between pre-service and in-service education. Instead the two should merge as continuing education. The Encyclopedia of Educational Research (1960) defines in-service education as consisting of "all school-personnel activities which are designed to increase professional competence."

Fishbeck (1968) views in-service education in terms of human behavior and knowledge content. Viewed in terms of human behavior, the changes ordinarily are identified as gaining new knowledge, increasing understanding, acquiring more desirable attitudes, and strengthening interests. Viewed in terms of materials, media, and knowledge itself,

changes may result in modification or amplification of existing curriculum as well as changes in teaching practices.

The purpose of this investigation is to determine the realtionship of aerospace in-service education to the attitudes and practices of teachers regarding aerospace education. This study is primarily concerned with determining the relationship of the first four Oklahoma Aerospace Education Workshops to the attitudes and practices of workshop participants regarding aerospace education.

## Statement of the Problem

The problem of this study is the relationship of aerospace education workshops to the attitudes and practices of self-reporting workshop participants regarding aerospace education.

To solve the problem and achieve the purpose of the study, a random sample of 200 workshop participants were assessed by means of two instruments: 1) an interview questionnaire designed to investigate certain practices employed by teachers regarding the teaching of aerospace concepts; and 2) an opinionnaire designed to investigate the attitudes of teachers toward aerospace education. These two instruments were also used to assess a random sample of 200 workshop applicants, who were not selected to attend any of the first four Oklahoma Aerospace Education Workshops. The latter sample was used primarily to obtain comparative data.

## Significance of the Study

The purpose to be served by this investigation is to determine the relationship of aerospace in-service education to the attitudes

and practices of workshop participants and to provide data that may aid persons involved in instituting state-wide aerospace education workshops.

It is anticipated that the determination of the relationship in question will give the Oklahoma State Department of Education and the Oklahoma Aeronautics Commission a more comprehensive evaluation of the effectiveness of the first four Oklahoma Aerospace Workshops and will help to infer value judgment to other approaches of in-service attempts.

## Hypotheses

1. Participation in aerospace education workshops is significantly related to positive attitudes toward aerospace education.
2. Participation in aerospace education workshops is significantly related to the following practices regarding aerospace education:
   a. Teaching of aerospace concepts
   b. Teaching a unit dealing with aerospace education
   c. Conducting field trips to local airports
   d. Utilization of the Aerospace Curriculum Guide that was prepared by the Oklahoma Aerospace Education Committee and the State Curriculum Improvement Commission in cooperation with the Oklahoma Aeronautics Commission
   e. Field trips to aerospace industries and installations
   f. Viewing films dealing with aerospace education
   g. Utilization of aerospace resource personnel
   h. Utilization of aerospace resource materials
   i. Building model airplanes
   j. Flying model airplanes

k. Building model rockets

l. Launching model rockets

m. Paper airplane contests

3. There is a significant relationship between attitudes toward aerospace education and the following demographic data:

a. Sex of the workshop applicant

b. Age of the workshop applicant

c. Teaching experience of the workshop applicant

d. Educational preparation of the workshop applicatn

e. Teaching level of the workshop applicant

f. Subject matter area of the workshop applicant

g. Size of community where the workshop applicant taught

## Research Questions

In addition to seeking answers to test the hypotheses, answers to the following questions were sought:

1. Do workshop applicants feel that aerospace education should be a vital part of the total educational plan in the State of Oklahoma?

2. Do workshop applicants feel that aerospace education workshops are necessary in providing proper educational experiences?

3. Do workshop applicants feel that field trips to aerospace industries and installations are important in providing proper educational experiences?

4. Do workshop applicants feel that the Legislature of the State of Oklahoma should continue to provide allocations to support future aerospace education workshops?

## Assumptions and Limitations

The study is limited by the inherent weakness of the instrumentation. The instruments used are straightforward devices for recording the teachers' feelings about aerospace education and their practices in regards to aerospace education brought about the the aerospace workshops. With suitable assurances of confidentiality, it is assumed that most teachers answered the questions with relative candor.

In light of the results for testing Hypothesis Three and the fact that the participant and nonparticipant groups were selected from educators who applied for the workshops, it is assumed that the population of this study is relatively homogeneous.

The random sampling procedure supports the assumption that the teachers selected are representative of the population of teachers who applied for participation in one of the first four Oklahoma Aerospace Education Workshops. There are no known reasons for believing that the subjects selected for this study are not typical of a much larger population of teachers. Strictly considered, however, the conclusions can only be generalized to the particular population which was sampled.

## Timing of the Study

The two instruments used for this study were constructed during December 1972 and field tested in January 1973. The reader is referred to Chapter III for a detailed description of the construction of the instruments.

Field testing was completed by the second week of February 1973 and the final set of instruments organized for data collection by

February 20, 1973. The analysis of the data and the writing of the dissertation were completed by August 1973.

The author feels that the timing of this study is an important consideration because the study deals with a topic (aerospace education) which is relatively new.

## Definition of Terms

1. Attitudes toward aerospace education:

   Attitudes toward aerospace education refers to how an individual feels about aerospace education--an emotionalized feeling for or against aerospace education as exhibited by the total score on the summated rating scaled opinionnaire used in this study.

2. Positive attitudes:

   Positive attitudes refer to a score of 105 or greater in the summated rating scale of the opinionnaire used in this study.

3. Practices regarding aerospace education:

   Practices regarding aerospace education refers to teacher practices which deal with aerospace education in or out of the classroom, as well as the amount of time spent teaching aerospace education concepts.

4. Aerospace education:

   Aerospace education is that branch of general education concerned with communicating knowledge, skills, and attitudes about aerospace activities and the total impact of air and space vehicles upon society. It must be distinguished from those branches of special education known as aeronautical and/or astronautical education which are concerned with training specialized aerospace workers.

5. Workshops:

Regular credit courses sponsored by a college or university during the summer session. They are designed to provide an adequate aerospace education background so that teachers will be able to conduct aerospace activities in the classroom.

6. Participants:

Educators who participated in at least one of the first four Oklahoma Aerospace Education Workshops.

7. Nonparticipants:

Educators who applied for participation in the first four Oklahoma Aerospace Education Workshops but were not selected to attend.

8. Applicants:

All educators (participants and nonparticipants) who applied for participation in the first four Oklahoma Aerospace Education Workshops.

# CHAPTER II

# REVIEW OF LITERATURE

## Background

Leaders in science education stress the importance of scientific method, concepts, and attitudes (Dutton, 1963). While progress has been made in these areas through in-service education, much work needs to be directed toward the development of positive attitudes toward science, as well as the practices employed in science education methodology.

In-service education is probably one of the most effective tasks of supervision for effecting change. Changes in human behavior, such as gaining new knowledge, increasing understanding, and acquiring more desirable attitudes may result in modification or amplification of existing curriculum, as well as changes in teaching practices.

The review of the literature summarized in this chapter includes studies which have surveyed programs in aerospace education. Some are programs concerned primarily with teacher aerospace education. Other studies deal with practices, either implemented or proposed, in aerospace education.

Curriculum changes may occur due to needs created by external forces outside the schools. Technical developments, economic needs, and social awareness are some forces which create a requirement for

curricular changes. The schools must anticipate these demands and answer the challenges by changes, adaptations or additions designed to best meet the curricular needs in the interest of the general welfare.

The American Association of the School Administrators (AASA) has stated a case for such a change, a change that calls for enrichmant through an aerospace-oriented curriculum.

> Aerospace is having a profound effect upon the institutions and peoples of the world. Technology has given mankind a vehicle capable of transporting men, their goods, and their ideas through aerial pathways at fantastic rates of speed. Frequently, in the past, science and inventions have speeded ahead of social adjustment, producing dislocations in society. The invention of the aeroplane and the discovery of atomic energy threaten to produce another period of social lag. Already aerospace has influenced events and conditions of life and transformed old patterns of social living. Every objective of education, every social, scientific, and economic area with which education deals has been affected. (Thomason, 1968, pp. 38-39).

Aerospace is a pervasive part of society in general and our culture and education in particular (Strickler, 1968, p. vii). Aerospace-oriented curricula with varying degrees of emphasis are a necessary part of our educational system. Aerospace education in the classroom is imperative if students are to have a meaningful understanding of our contemporary world (Johnson, 1968).

The need for teachers to acquire a reasonable understanding of aerospace concepts may be fulfilled by means of aerospace in-service education.

Aerospace education in-service training is not a new idea. One of the earliest known efforts to recognize the need for training teachers in aerospace-related subjects took place in Missouri. Finis E. Engleman organized and taught a course in aerospace for teachers at the Kansas City, Missouri, Teachers' College in the early 1920's.

One of the earliest recorded large-scale efforts in teacher aerospace education occurred at New York University during the 1928 School of Education Summer Session, supported by the Daniel Guggenheim Fund. The participants included teachers of both elementary and secondary schools. The course was designed for the professional education of the teachers served by the New York University School of Education.

Strickler (1968) points out that the New York University Teacher Education course was a pathfinder and a historic one from which have come hundreds of aerospace education workshops, seminars, institutes, and other in-service programs for teachers.

Among the most popular and effective higher education programs in the post-World War II era were the aerospace education workshops for teachers (Strickler, 1968, p. 314). While major leadership efforts for these programs came from the aviation education staff members of the Civil Aeronautics Administration, working through state departments of education, teacher-training institutions, regional and local groups, thousands of classroom teachers were given first hand aerospace experience and background. By 1948, nearly 100 teacher-training institutions had plans for helping teachers learn more about aerospace education.

The aerospace workshop, an outgrowth of aviation education workshops that have been conducted on campuses since the late 40's, took on new emphasis. In workshops up to 1962, The Aviation Education Committee of the American Association of Colleges for Teacher Education (Dolezal, 1962, pp. 16-17) recommended the following objectives:

1. An adequate reading and speaking vocabulary of aviation.
2. Knowledge of the importance of weather and climate to successful aviation.
3. General knowledge and understanding of the simple scientific principles of flight.

4. Understanding the place of aviation in peace and war.
5. Understanding the effects of air transportation on various levels of international relationships.
6. Introduction of the social, economic and political implications of current and future aviation development; a realization of the growing interdependence of people through aviation.
7. Appreciation of the services rendered by airports and their associated personnel.
8. Knowledge of available aviation education resources in materials, personnel and equipment for instructional purposes.
9. The know-how for organizing units of aviation education and providing resulting learning experience for children through student or directed teaching.

The concepts of space science began to permeate the aviation education workshops and by 1963 the name of aviation education had been supplanted by the term aerospace. The National Aeronautics and Space Administration created the Office of Technical Information and Educational Programs within its organization to support educational institutions in the following areas:

1. Assisting schools and colleges in structuring courses, seminars and institutes in space science, and providing resource people, visual aids, and space-science demonstrations.
2. Developing and making available pamphlets, booklets, brochures and instructional materials to assist educators in their timely space-education efforts.
3. Developing and distributing to educational groups films, slides, charts and exhibits designed to prpmote better understanding of space science, related technology and the many implications of space exploration.
4. Developing "Spacemobiles" to bring to school and college groups a mobile space-science unit, utilizing special equipment to demonstrate basic principles of rocketry, launching and orbiting of satellites, deep-space probes, and examples of significant space experiments achieved by spacecraft such as Tiros, the weather satellite; Echo, the communication satellite and Pioneer V; the sun satellite.
5. Coeperating with national, state and local educational organizations and with aerospace industries to engender programs in space education and participating in the programs of many educational organizations.
6. Cooperating with educational television and commercial TV stations and networks in production and presentation of space programs. (Evans, 1961, p. 570).

Webb (1962, pp. 28-30) who was the administrator of the National Aeronautics and Space Administration in 1962, made the following comments concerning part of NASA's contributions to education:

> Our Office of Educational Programs and Services is working closely with many of the National Education Association affiliates, with the U. S. Office of Education, with the National Science Foundation and with other national organizations and groups having an interest in and responsibility for education.
>
> We are utilizing NASA's scientific and technical sources of space information to develop materials for books, booklets, pamphlets and educational publications, in cooperation with practicing educators. We are making available to the public in useful form much of the exciting motion picture footage on our rocket launches, on the work of our scientific satellites, and on many other unusual and intriguing technological developments. We are working diligently to make as much as possible of this type of information available to classroom teachers and to adult groups across the Nation and around the world.
>
> We are assisting colleges and universities in organizing and conducting workshops and other programs designed to provide teachers at all age and grade levels with better understanding of space science and technology and of the implications of our push into space.
>
> One of our most successful educational service undertakings has been the spacemobile program. The exhibits and lecturers aboard the spacemobile provide the school, college, or lay audience with accurate, up-to-date information on space science and exploration. A typical demonstration is about 50 minutes long and answers six basic questions: What is a satellite? How does it get into orbit? What keeps it in orbit? What does it do? What good is it? What are NASA's plans for future research and space exploration?

NASA's support to education via providing assistance to teachers' workshops is carried out primarily by Spacemobile lecturers. These lecturers are specialists in education, being well prepared in teaching techniques as well as space science concepts. Each lecturer's unit contains a set of rocket and satellite models plus audio-visual materials to present lectures to student audiences or teacher workshops. The most often used practice in workshops is the NASA resource person actively participating for three to five days presenting resource

materials and space science concepts to the workshop participants (Evans, 1961).

In recent years, one of the largest sustained statewide teacher education programs of aerospace education has been that sponsored by the Governor of Tennessee through the Tennessee Aeronautics Commission. Teachers are provided expense and tuition scholarships to attend either a basic or advanced aerospace education workshop for college credit. In conducting its program, the Tennessee Aeronautics Commission works in cooperation with the Tennessee Department of Education, Civil Air Patrol, National Aeronautics and Space Administration, and the Federal Aviation Administration. In its 19th year of operation, the Tennessee program is of nationwide significance (Strickler, 1968, p. 314).

The State of Oklahoma has initiated a similar program. During the summer of 1969 teachers from all areas of the State of Oklahoma were invited to Oklahoma State University to participate in a three-week statewide aerospace education workshop. These teachers took part in a workshop that included lectures,demonstrations, activity sessions, and field trips to aerospace installations such as the NASA Space Centers, aerospace industries, and military complexes.

For several years educators and lay people in the State of Oklahoma have been concerned about the apparent lack of educational application in the area of aerospace education. In 1967 in Oklahoma, out of the 120,000 high school students, fewer than fifty were enrolled in any type of air education course. There were only three schools in the entire state which offered such a program.

When this situation was called to the attention of Governor Dewey Bartlett, he immediately named an Air Education Committee to investigate

this situation and what could be done to stimulate air education in Oklahoma schools. These programs were located at Kingfisher, Poteau, and Wagoner, Oklahoma (Miller, 1972).

In a news release Governor Bartlett (June 9, 1968) stated:

> During the past school year, we had only three Oklahoma high schools which had air education classes. There were fewer than 50 students out of 120,000 in the state who were exposed to air education. This does not make sense when one out of six people in Oklahoma City, for example, derives his income from the aerospace industry. It does not make sense when aviation is the fastest growing industry in Oklahoma. This lack of air education must be remedied. I have therefore appointed a number of people who are most concerned with this problem who are daily working with education, aviation and aerospace industry to serve on my committee. I feel confident that through these appointments and through this committee, we can vastly increase the number of public schools in Oklahoma which will offer air education courses in their curricula. This will be our goal. With the help of the committee, we should be able to put Oklahoma at the top of the ladder in this field.

The reader is referred to Appendix E for a detailed discussion of the plans set forth by the Governor's Committee on Air Education for the formation of a statewide aerospace education program.

On July 9, 1969, the first Oklahoma Aerospace Education Workshop began on the campus of Oklahoma State University. In attendance at the workshop were one hundred and four teachers from sixty cities and towns across the State of Oklahoma.

Due to the apparent success of the workshops and widespread influence of teachers and school administrators, the Legislature has approved funding for four statewide workshops in aerospace education. The first two aerospace workshops were sponsored by Oklahoma State University. A third workshop was held at Southeastern State College during the summer of 1971 and the fourth during the summer of 1972 at Northeastern State College.

Many other cases can be cited about the widely spread interest of aerospace in-service education throughout the nation. For example, during the summer of 1972 over 130 aerospace in-service education programs were instituted throughout the United States (Headquarters, Civil Air Patrol, May, 1973).

Despite this widespread interest in aerospace, little has been done in the area of evaluating and determining the effectiveness of aerospace in-service programs.

## Aerospace Education Studies

In a study of the first two aerospace education workships in the State of Oklahoma, Miller (1972) used the data obtained from 160 subjects to establish that the aerospace education workshops were successful in reaching the following stated goals: 1) to stimulate a widespread awareness of aerospace education at all levels of instruction; 2) to develop means to stimulate the teachers' interest in aerospace education; 3) to train teachers and administrators in the application of aerospace education in schools; 4) to make aerospace education available to all grade levels of Oklahoma students; 5) to encourage closer affiliation between educational institutions and aerospace industries; 6) to train teachers for a specialized course in aviation at the high school level.

Miller concluded that all stated goals were successfully met except Number 2 which was in the process of being met by a third aerospace education workshop which was already being planned for the summer of 1971.

Further, Miller recommended that an expanded study including teachers who were not participants in the aerospace workshops be conducted in order to ascertain the differences in attitudes and teacher practices that the workshops have brought about.

Sanders (1967) conducted a study in order to determine what would be the appropriate content for a college program that would provide elementary and secondary school teachers with a general knowledge of aerospace.

Based on his results, Sanders recommended that three college courses be offered: Aerospace Education for Elementary Teachers; Aviation Education for Secondary Teachers; and Space Education for Secondary Teachers. He also recommends that field trips to aerospace industries be included as part of the courses; resource speakers and part-time industrial instructors be utilized; teacher membership in aerospace education associations be encouraged; and all teachers should be versed in matters pertaining to career guidance.

Johnson (1966) conducted a study for the purpose of establishing an aerospace curriculum for fifth and sixth grade science programs. In his conclusion, Johnson indicated that there are large numbers of aerospace concepts suitable for inclusion in aerospace studies at the fifth and sixth grade levels, but that current elementary textbooks were not suited for use as aerospace education resource material at those grade levels.

Butler (1965) conducted a study with the following purposes: 1) to define the aerospace dimension within the secondary education curriculum; and 2) to provide an aerospace science course of study for college preparatory at the 12th grade level.

For a period of over three years, Butler developed an aerospace science course for college-bound 12th grade students at Marion Center Joint High School in Indiana, Pennsylvania. Butler (1965, p. 24) summarized the course as follows:

> This preliminary course of study in aerospace science attempted to bridge the gap between geography and natural science courses presently developed for the high school student in Pennsylvania and the vast technological knowledge needed by the modern student who stands on the brink of space.
>
> In an era when technology engulfs the mind of youth, a sense of realism and value must be incorporated into aerospace science teaching and student activities. Participation in a science fair strengthens the aerospace learnings since it is a means for student expression, practical cooperation among many disciplines, and a concrete method for students to aid the process of adult education. A safe rewarding extension is found by delegating a division within a science club to study the use of rockets.

In his recommendations, Butler suggests the following minimum requirements for aerospace education teacher certification: 1) 12 semester hours in physics; 2) 8 semester hours in chemistry; 3) 4 semester hours in biology; 4) 9 semester hours in mathematics to include analytical geometry, statistics, and integral calculus; and 5) 21 semester hours in physical geography to include a minimum of 6 hours in astronomy and 3 hours each in cartography, physiogeography, geology, meteorology and climatology.

A study conducted by Zaharevitz (1959) gives recommended curricula for in-service aerospace education. Responses to an open-form questionnaire survey indicated that the optimum length of an aerospace workshop should be four weeks in duration. Results of the survey indicated topics and/or activities in greatest demand. They are listed according to order of importance: 1) basic fundamentals of aviation and

astronautics; 2) orientation flights; 3) field trips; and 4) planning an aerospace unit.

Zaharevitz (1959, pp. 80-87) made the following recommendations:

A. The workshop shall serve all teachers, school administrators, laymen interested in aviation and mature students preparing to become teachers.

B. The aviation education workshop shall provide each participant with:

1. An adequate reading and speaking vocabulary of aviation and astronautics.

2. The importance of weather and climate to successful aviation.

3. A general knowledge and understanding of airplane structure.

4. A general knowledge and understanding of the simple scientific principles of flight.

5. An understanding of the place of aviation in peace and war.

6. An understanding of the effects of air transportation on various levels of international relationships.

7. An introduction to the social, economic and political implications of current and future aviation development.

8. An appreciation of the services rendered by airports and their associated personnel.

9. Familiarity with existing and needed basic governmental services.

10. A knowledge of available aviation education resources in materials, personnel and equipment for instructional purposes.

11. A realization of the growing interdependence of people through aviation.

12. A realization of how the airplane has changed geographic relationships--particularly in terms of mankind's concepts of time, place and distance.

Anderson (1955) conducted a survey study of aerospace curricula in selected secondary schools throughout the United States. The central problem of his study concerned determination of: 1) methods of introducing aviation education into existing curricula; 2) organizational and administrative practices; 3) educational and professional background of teachers teaching aviation education; 4) assessment of aerospace resources and instructional materials used; and 5) financial support to aviation education in the various schools selected.

In relation to the categories above, some important findings are summarized as follows: 1) about 90 percent of the schools surveyed had offered aviation education as a regular class; 2) 72 percent of the schools reported they had no laboratory facilities; and 3) 95 percent of the schools taught aviation education in the 12th grade.

In terms of organizational and administrative practices the study revealed that: 1) 77 percent of the schools indicated aviation education should be an integral part of education for secondary schools; 2) 48 percent of the schools indicated aviation education could be taught successfully in one or more other courses as a separate unit; and 3) administrators had been considerably higher in cooperation with aviation education than other selected groups.

The educational background of teachers teaching aviation education indicated that: 1) all but one instructor held at least a bachelor's degree; 2) 31 percent of the instructors reported they held a major in education; 3) 25 percent reported they held a major in mathematics.

The professional background of teachers teaching aviation education revealed that: 1) 18 percent of the instructors taught from one to five years at the elementary level; 2) 33 percent reported they had taught from one to five years at the secondary level; 3) 31 percent reported they had taught six to ten years at the secondary level; 4) 19 percent indicated they had taught more than 15 years at the secondary level; 5) 15 percent reported they had taught from one to five years at the college level; 6) 44 percent held current pilot rating; 7) 51 percent indicated they had flown as pilots at one time or another; and 8) 57 percent of the instructors indicated they had been members of the Civil Air Patrol.

In his Doctoral Dissertation, Strickler (1951, p. 162) proposed to establish an operational definition of aviation education and to describe the Air Center as a means for implementing aviation. His proposed operational definition of aviation education is as follows:

> Aviation education is that branch of general education concerned with communicating knowledge, skills and attitudes about aviation and its impact upon society. It must be distinguished from that branch of special education known as astronautical education, which is concerned with training specialized aviation workers.

In regards to describing the Air Center, Strickler (1951, p. 80) stated that:

> The air center in aviation is primarily a tool, it is a means of furthering the educational use of aviation content in general education. Otherwise expressed, it facilitates

> the dissemination of appropriate knowledge in aviation education. The air center, in short, may be described as an educational instrument or facility.

Pawelek (1950) conducted a survey study of the general and special literature in air-age education. On the basis of the evidence brought forth by the investigation, Pawelek concluded that: 1) there is a definite nationwide interest in aviation education at all levels of instruction; 2) many eminent educators are concerned with the problems of aviation as it pertains to teacher training institutions; 3) there is an abundance of vocational literature concerning aviation but relatively little of professional kind in the realm of teacher education; 4) government, industries and state departments of education are active in the publication of air-age education materials; 5) the American Association of Colleges for Teacher Education had displayed great interest in and is attempting to assist member colleges with the problem of air-age education; 6) career possibilities in aviation are many and varied with great possibilities for the future; 7) being able to pilot a plane is a desirable qualification for teachers of aviation education; 8) having flown is a necessity for aviation teachers; 9) the best method of offering aviation education to teachers is through the workshop approach of in-service education; and 10) that technical aspects of aviation education should be minimized in favor of the general education aspects.

# CHAPTER III

## DESIGN AND METHODOLOGY

### Procedure of the Study

The inception of this study came as a result of a study conducted by Miller (1972), where he makes the recommendation that an expanded study be undertaken to ascertain the relationship of aerospace in-service education to attitudes towards aerospace education and the practices employed in the teaching of aerospace concepts.

The purpose of this investigation is to confirm empirical knowledge about the relationship of the first four Oklahoma Aerospace Education Workshops to attitudes and practices regarding aerospace eucation.

To solve the problem and achieve the purpose of the study, the listing of all teachers who applied for participation in the first four Oklahoma Aerospace Education Workshops were obtained from the Oklahoma Aeronautics Commission. The list of applicants consisted of two groups. Those applicants who were selected to attend the workshops and those who were not. The criteria used for selection of the workshop participants are as follows: 1) representation of all geographical sections of the State of Oklahoma; 2) representation of all grade levels (K-12); 3) representation of most curriculum areas; 4) close approximation in number between male and female teachers; and 5) the endorsement of the participant by the school administrator. (Formation of the first four

Oklahoma Aerospace Education Workshops is discussed in detail in Appendix E.)

From the listing of all workshop participants a sample of 200 teachers was randomly selected by arranging the list in alphabetical order, then assigning a random number to each subject. The workshop participant group totaled 382 teachers.

The procedure used for selecting workshop participants was also employed in selecting 200 nonparticipants for the purpose of obtaining comparative data. The nonparticipant group totaled 437 teachers. The teachers' attitudes and practices regarding aerospace education were assessed in this study through the use of two separate instruments: an opinionnaire designed to evaluate how teachers feel about aerospace education and an interview questionnaire designed to investigate certain practices employed by teachers involved in teaching aerospace concepts.

The two instruments used for this study were constructed during December 1972 and field tested by a group of fourteen teachers enrolled in an aerospace education course in January 1973. A detailed description of the construction of the instrument is given on page 26.

Field testing was completed by the second week of February 1973 and the final set of instruments organized for data collection by February 20, 1973.

Due to the large number of subjects surveyed, the mail questionnaire survey technique was used for the collection of data. The prestamped opinionnaire (Appendix A) and interview questionnaire (Appendix B) along with a cover letter (Appendix C) were mailed to all the workshop applicants who were randomly selected to participate as subjects

in the study. A follow-up letter (Appendix D) along with another set of instruments was mailed to the nonparticipating group with the hope of obtaining an equivalent amount of return between the two groups in order to strengthen the test of comparability.

The return data were tallied on each opinionnaire and interview questionnaire, and the scores punched into computer data cards for processing by an IBM 360 Computer at Oklahoma State University. The return data consisted of 58% for the participant group and 41% for the nonparticipant group.

Ten percent of the opinionnaires and interview questionnaires sent to the nonparticipant group were returned with postal stamp indicating inability to locate the recipients, while only three percent indicated the same for the participant group.

Total score of the opinionnaires was used for testing Hypothesis One. (A detailed discussion on treatment of the data is given on page 28.) Data to test Hypothesis Two were derived from scores of the first 14 items in the interview questionnaire.

The demographic data which consists of Questions Four through Ten on the interview questionnaire were used for evaluating Hypothesis Three. Research Questions One, Two, Three and Four were evaluated by the use of items from the opinionnaire as follows: Items 2, 10, 13, and 16 were used to evaluate Research Question One; Items 23, 24, and 31 were used to evaluate Research Question Two; Item 3 was used to evaluate Research Question Three; and Item 24 was used to evaluate Research Question Four.

## Description of Population

The population of this study consists of a total of 819 educators who applied for participation in at least one of the first four Oklahoma Aerospace Education Workshops. Of the 819 applicants, a group of 382 were selected by the Oklahoma Aeronautics Commission to attend the workshops. Throughout the study the selected group is referred to as the participant group. The remaining 437 applicants are referred to as the nonparticipant group. The latter group was used primarily for the purpose of obtaining comparative data which will help in determining the differences in attitudes and practices the workshops have brought about.

Two random samples consisting of 200 subjects each were used in the study. One sample was obtained from a listing of all workshop participants; the other was randomly selected from a list of all the remaining applicants who were not selected to attend the workshops.

## Instrumentation

### Design

To solve the problem and achieve the purpose of the study, a random sample of 200 workshop participants were assessed by means of two instruments: 1) an interview questionnaire designed to investigate certain practices employed by teachers regarding the teaching of aerospace concepts; and 2) an opinionnaire designed to investigate attitudes of teachers toward aerospace education. These two instruments were also used to assess the random sample of 200 workshop applicants who were not selected to attend the workshops. The latter group, which was

used to obtain comparative data, permitted the use of the chi-square statistical treatment to determine the relationship of the workshops to attitudes and practices regarding aerospace education.

## Construction

The interview questionnaire contains two major parts. The structure of the first part consists of 21 items which were used for determining teacher practices regarding aerospace education. The second part of the interview questionnaire consists of 8 items used primarily to obtain demographic data which might have been influencing factors to the attitudes of teachers regarding aerospace education.

Information for the construction of the first part of the interview questionnaire was obtained foremost from information on activities conducted during the first four Oklahoma Aerospace Education Workshops.

The first step in the construction of the opinionnaire scale used in this study was to obtain statements which were representative of the area being tested. Most of the statements used in the scale were obtained by compiling a list of statements gathered from literature related to aerospace education. The cirteria used for selecting and editing these opinionnaire statements is similar to one used by Dutton and Stephens (1963), which was prepared by Wang, Thurstone, Likert, and Edwards (1957). An attempt was made to eliminate statements which were factual or might be interpreted as factual. Elimination of ambiguous statements or statements with more than one interpretation was also attempted.

After editing, there were 47 statements dealing with attitudes toward aerospace education and 50 dealing with practices regarding the

teaching of aerospace concepts. About one third of the 47 items showing feelings toward aerospace education were stated in a negative format in order to encourage authenticity of responses. A summated rating scale (Likert-type) was used in order to place each subject somewhere in an agreement continuum of five categories (strongly agree, agree, neutral, disagree, strongly disagree). The 50 statements dealing with practices regarding the teaching of aerospace concepts were also arranged in a list format but the responding scale used is the yes-no-no response alternatives.

The statements were analyzed by a group of doctoral students during dissertation proposal seminar and then arranged in booklet form as separate sections. After revisions were made based on feedback from the group, the two sets of statements were administered to a group of fourteen teachers. The teachers' responses and discussion allowed for further revision and validation of the instrumentation. After revisions, the final check was made by three science education professors at Oklahoma State University who served as judges independently.

The finalized interview questionnaire contains 29 items and the opinionnaire contains 31 items (Appendices A and B).

## Treatment of the Data

In the analysis of the data, chi-square and percentage distribution techniques were used. Where the chi-square test showed that there was most likely a relationship between variables, the contingency coefficient was computed to give an indication of the degree of the relationship.

The chi-square test was applied to the data obtained from responses to each interview questionnaire item and to the total score on the questionnaire. The total score of the questionnaire (summated rating scale) was analyzed according to an agreement continuum of five categories representing intervals of scores as follows: strongly agree (155-130); agree (129-105); neutral (104-80); disagree (79-55); and strongly disagree (54-31).

The hypotheses were tested for divergence between the observed frequencies and those expected. Percentage distribution of the data was used in analyzing Research Questions 1, 2, 3, and 4.

# CHAPTER IV

## RESULTS OF THE STUDY

The results of the statistical analyses of the hypotheses and research questions are reported in this chapter. The three hypotheses to be tested are stated in the null form as follows:

Hypothesis One: Participation in aerospace education workshops is not significantly related to positive attitudes toward aerospace education.

Hypothesis Two: Participation in aerospace education workshops is not significantly related to the following practices regarding the teaching of aerospace concepts:

a. Teaching of aerospace concepts
b. Teaching a unit dealing with aerospace education
c. Conducting field trips to local airports
d. Utilization of the Aerospace Curriculum Guide that was prepared by the Oklahoma Aerospace Education Committee and the State Curriculum Improvement Commission in cooperation with the Oklahoma Aeronautics Commission
e. Field trips to aerospace industries and installations
f. Viewing films dealing with aerospace education
g. Utilization of aerospace resource personnel
h. Utilization of aerospace resource materials
i. Building model airplanes

j. Flying model airplanes

k. Building model rockets

l. Launching model rockets

m. Paper airplane contests

Hypothesis Three: There is no significant relationship between attitudes toward aerospace education and the following demographic data:

a. Teaching level of the workshop applicant

b. Sex of the workshop applicant

c. Age of the workshop applicant

d. Teaching experience of the workshop applicant

e. Educational preparation of the workshop applicant

f. Subject matter teaching area of the workshop applicant

g. Size of community where the workshop applicant taught

In addition to seeking answers to test the hypotheses, answers to the following questions were sought:

1. Do workshop applicants feel that aerospace education should be a vital part of the total educational plan in the State of Oklahoma?

2. Do workshop applicants feel that aerospace education workshops are necessary in providing proper educational experiences?

3. Do workshop applicants feel that field trips to aerospace industries and installations are important in providing proper educational experiences?

4. Do workshop applicants feel that the Legislature of the State of Oklahoma should continue to provide allocations to support future aerospace education workshops?

## Hypothesis One

Shown in Table I is the relationship of workshop participation to attitudes towards aerospace education.

TABLE I

CHI-SQUARE VALUES REFLECTING RELATIONSHIP OF WORKSHOP PARTICIPATION TO ATTITUDES TOWARDS AEROSPACE EDUCATION

| Groups | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| Participants | 29* | 85 | 8 | 0.00 | 0.00 | | | | |
| | | | | | | 16.14 | 4 | <0.005 | 0.272 |
| Non-participants | 4 | 62 | 14 | 0.00 | 0.00 | | | | |

*Data reported as frequency

As indicated on Table I, the results of the Chi-square test show a significant relationship. The computed Chi-square value of 16.14 called for the rejection of the null hypothesis, ($P<0.005$).

## Hypothesis Two

The relationship of workshop participation to practices regarding aerospace education is presented in Tables II through VI.

Shown in Table II is the relationship of workshop participation to teaching of aerospace concepts

TABLE II

CHI-SQUARE VALUES REFLECTING RELATIONSHIP OF WORKSHOP PARTICIPATION TO TEACHING OF AEROSPACE CONCEPTS

| Groups | Yes | No Response | No | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|
| Participants | 85* | 5 | 32 | | | | |
| | | | | 26.398 | 2 | <0.000 | 0.340 |
| Non-participants | 28 | 2 | 50 | | | | |

*Data reported as frequency

As indicated in Table II, the results of the chi-square test show a significant relationship of workshop participation to teaching aerospace education. The computed chi-square value of 26.398 called for the rejection of the null hypothesis, ($P<0.000$).

Shown in Table III is the relationship of workshop participation to teaching a unit dealing with aerospace education.

TABLE III

CHI-SQUARE VALUES REFLECTING RELATIONSHIP OF WORKSHOP PARTICIPATION TO TEACHING A UNIT DEALING WITH AEROSPACE EDUCATION

| Groups | Yes | No Response | No | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|
| Participants | 79* | 5 | 38 | | | | |
| | | | | 19.33 | 2 | <0.000 | 0.300 |
| Non-participants | 28 | 2 | 50 | | | | |

*Data reported as frequency

Results of the chi-square test as indicated on Table III show a significant relationship of workshop participation to teaching a unit dealing with aerospace education. The computed chi-square value of 19.33 called for rejection of the null hypothesis, ($P<0.000$).

Shown in Table IV is the relationship of workshop participation to engagement by the teachers in the various aerospace education activities.

TABLE IV

CHI-SQUARE VALUES REFLECTING RELATIONSHIP OF WORKSHOP PARTICIPATION TO ENGAGEMENT IN AEROSPACE EDUCATION ACTIVITIES

| Aerospace Education Activities | Yes | | No response | | No | | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | Part. | Nonpart. | Part. | Nonpart. | Part. | Nonpart. | | | | |
| Field Trips | 48* | 11 | 44 | 52 | 30 | 17 | 19.580 | 2 | <0.000 | 0.297 |
| Use of Films | 65 | 21 | 46 | 51 | 11 | 8 | 15.166 | 2 | <0.000 | 0.264 |
| Use of Resource Person | 51 | 14 | 45 | 50 | 26 | 16 | 15.650 | 2 | <0.000 | 0.268 |
| Use of Resource Materials | 63 | 23 | 47 | 51 | 12 | 6 | 12.579 | 2 | 0.001 | 0.242 |
| Building Model Airplanes | 35 | 12 | 52 | 52 | 35 | 16 | 10.035 | 2 | 0.010 | 0.218 |
| Flying Model Airplanes | 26 | 8 | 58 | 53 | 38 | 19 | 7.688 | 2 | 0.025 | 0.191 |
| Building Model Rockets | 30 | 12 | 59 | 51 | 33 | 17 | 4.895 | 2 | N.S. | --- |
| Launching Model Rockets | 35 | 11 | 57 | 52 | 30 | 17 | 7.958 | 2 | 0.025 | 0.195 |
| Paper Airplane Contests | 51 | 15 | 48 | 51 | 23 | 14 | 13.780 | 2 | 0.001 | 0.253 |

*Data reported as frequency

As indicated on Table IV, the results of the chi-square test show a significant relationship of workshop participation to all the aerospace education activities listed except "Building model rockets." The computed chi-square value called for rejection of the null hypothesis at the levels of significance indicated, except the null hypothesis regarding the building of model rockets, in which case the null hypothesis must be accepted.

Shown in Table V is the relationship of workshop participation to local airport field trip activities conducted by workshop applicants.

TABLE V

CHI-SQUARE VALUES REFLECTING RELATIONSHIP OF WORKSHOP PARTICIPATION TO LOCAL AIRPORT FIELD TRIP ACTIVITY

| Groups | Yes | No Response | No | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|
| Participants | 47* | 46 | 29 | | | | |
| | | | | 16.050 | 2 | <0.000 | 0.271 |
| Non-participants | 13 | 52 | 15 | | | | |

*Data reported as frequency

Results of the chi-square test as indicated on Table V show a significant relationship of workshop participation to local airport

field trips. The computed chi-square value of 16.050 called for the rejection of the null hypothesis, ($P<0.000$).

Shown in Table VI is the relationship of workshop participation to the use of the Aerospace Education Curriculum Guide by the workshop applicants.

TABLE VI

CHI-SQUARE VALUE REFLECTING RELATIONSHIP OF WORKSHOP PARTICIPATION TO THE USE OF THE AEROSPACE EDUCATION CURRICULUM GUIDE

| Groups | Yes | No Response | No | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|
| Participants | 52* | 44 | 26 | | | | |
| | | | | 20.736 | 2 | <0.000 | 0.305 |
| Non-participants | 10 | 42 | 28 | | | | |

*Data reported as frequency

As indicated in Table VI, the results of the chi-square test show a significant relationship of workshop participation to use of the curriculum guide. The computed chi-square value of 20.736 called for the rejection of the null hypothesis, ($P<0.000$).

## Hypothesis Three

The relationship between attitudes toward aerospace education and the following demographic data are presented in Table VII through Table XIII: teaching level of the workshop applicant; sex of the workshop applicant; age of the workshop applicant; teaching experience of the workshop applicant; educational preparation of the workshop applicant; subject matter area of the workshop applicant; and the size of the community where the workshop applicant taught.

Shown in Table VII is the relationship between the teaching level of the workshop applicants and their attitudes toward aerospace education.

TABLE VII

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN TEACHING LEVEL AND ATTITUDES TOWARDS AEROSPACE EDUCATION

| Teaching Level | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| K-3 | 5* | 19 | 2 | 0 | 0 | | | | |
| 4-6 | 7 | 42 | 6 | 0 | 0 | | | | |
| | | | | | | 3.329 | 12 | N.S. | --- |
| 7-9 | 2 | 23 | 3 | 0 | 0 | | | | |
| 10-12 | 13 | 45 | 6 | 0 | 0 | | | | |

*Data reported as frequency

As revealed in Table VII, the results of the chi-square test show a nonsignificant relationship between teaching level and attitudes toward aerospace education. The computed chi-square value of 3.329 called for accepting the null hypothesis.

Shown in Table VIII is the relationship between the sex of the workshop applicant and their attitudes toward aerospace education.

TABLE VIII

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN THE SEX OF THE WORKSHOP APPLICANT AND ATTITUDES TOWARD AEROSPACE EDUCATION

| Sex | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| Male | 13* | 57 | 11 | 0 | 0 | | | | |
| | | | | | | 1.354 | 4 | N.S. | --- |
| Female | 19 | 89 | 10 | 0 | 0 | | | | |

*Data reported as frequency

As indicated in Table VIII, the results of the chi-square test show a nonsignificant relationship between sex and attitudes toward aerospace education. The computed chi-square value of 1.354 called for acceptance of the null hypothesis.

Shown in Table IX is the relationship between the age of the workshop applicant and their attitudes toward aerospace education.

TABLE IX

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN AGE OF THE WORKSHOP APPLICANT AND ATTITUDES TOWARD AEROSPACE EDUCATION

| Age | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| 50-59 | 8* | 46 | 5 | 0 | 0 | | | | |
| 40-49 | 8 | 39 | 4 | 0 | 0 | | | | |
| | | | | | | 1.697 | 16 | N.S. | --- |
| 30-39 | 10 | 40 | 6 | 0 | 0 | | | | |
| 26-29 | 2 | 8 | 1 | 0 | 0 | | | | |
| under 25 | 1 | 2 | 0 | 0 | 0 | | | | |

*Data reported as frequency

As indicated on Table IX, the results of the chi-square test show a nonsignificant relationship between age and attitudes toward aerospace education. The computed chi-square value of 1.697 called for accepting the null hypothesis.

Shown in Table X is the relationship between the number of years that the workshop applicant has taught and their attitudes toward aerospace education.

TABLE X

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN NUMBER OF YEARS TEACHING EXPERIENCE AND ATTITUDES TOWARD AEROSPACE EDUCATION

| Years Teaching Experience | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| I-3 | 5* | 7 | 2 | 0 | 0 | | | | |
| 4-6 | 2 | 22 | 2 | 0 | 0 | | | | |
| | | | | | | 10.629 | 16 | N.S. | --- |
| 7-9 | 6 | 29 | 2 | 0 | 0 | | | | |
| 10-12 | 3 | 10 | 4 | 0 | 0 | | | | |
| 13-15 | 5 | 15 | 2 | 0 | 0 | | | | |

*Data reported as frequency

The results of the chi-square test shown on Table X indicate that there is no significant relationship between teaching experience and attitudes toward aerospace education. The computed chi-square value called for accepting the null hypothesis.

Shown in Table XI is the relationship between attitudes toward aerospace education and the degree held.

TABLE XI

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN EDUCATIONAL PREPARATION AND ATTITUDES TOWARD AEROSPACE EDUCATION

| Degrees | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| Associate | 0* | 1 | 0 | 0 | 0 | | | | |
| Bachelor | 17 | 46 | 3 | 0 | 0 | | | | |
| | | | | | | 11.342 | 12 | N.S. | --- |
| Master's | 14 | 96 | 19 | 0 | 0 | | | | |
| Doctorate | 1 | 3 | 0 | 0 | 0 | | | | |

*Data reported as frequency

As indicated in Table XI, the results of the chi-square test show a nonsignificant relationship between educational preparation and attitudes toward aerospace education. The computed chi-square value resulted in the acceptance of the null hypothesis.

Shown in Table XII is the relationship between the subject matter area which the workshop applicants are teaching and their attitudes toward aerospace education.

TABLE XII

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN SUBJECT MATTER TEACHING AREA AND ATTITUDES TOWARD AEROSPACE EDUCATION

| Subject Matter Area | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| Science | 6* | 37 | 0 | 0 | 0 | | | | |
| Mathematics | 4 | 14 | 4 | 0 | 0 | | | | |
| Language Arts | 5 | 29 | 6 | 0 | 0 | | | | |
| | | | | | | 10.715 | 16 | N.S. | --- |
| Social Sciences | 1 | 15 | 3 | 0 | 0 | | | | |
| Humanities | 1 | 2 | 1 | 0 | 0 | | | | |

*Data reported as frequency

The results of the chi-square test shown on Table XII indicate that there is no significant relationship between the subject matter area and attitudes toward aerospace education. The computed chi-square value called for accepting the null hypothesis.

Shown in Table XIII is the relationship between the size of the community where the workshop applicants taught and their attitudes toward aerospace education.

TABLE XIII

CHI-SQUARE VALUES REFLECTING RELATIONSHIP BETWEEN THE SIZE OF THE COMMUNITY WHERE THE WORKSHOP APPLICANTS TEACH AND ATTITUDES TOWARD AEROSPACE EDUCATION

| Size of Community | SA | A | N | D | SD | $X^2$ | DF | Level of Sig. | C |
|---|---|---|---|---|---|---|---|---|---|
| Metropolitan | 4* | 24 | 5 | 0 | 0 | | | | |
| Suburban | 2 | 17 | 0 | 0 | 0 | | | | |
| Pop. 25,000-100,000 | 7 | 30 | 5 | 0 | 0 | | | | |
| | | | | | | 6.321 | 16 | N.S. | --- |
| Pop. 5,000-9,999 | 6 | 24 | 6 | 0 | 0 | | | | |
| Pop. less than 5,000 | 14 | 50 | 6 | 0 | 0 | | | | |

*Data reported as frequency

As indicated in Table XIII, the results of the chi-square test show a nonsignificant relationship between size of the community and attitudes toward aerospace education. The computed chi-square value called for accepting the null hypothesis.

Research Question Number One

Do workshop applicants feel that aerospace education should be a vital part of the total educational plan in the State of Oklahoma?

To obtain an answer to Research Question Number One, items 2, 10, 13, and 16 of the opinionnaire (see Appendix A) were analyzed.

Table XIV shows the responses of the workshop applicants to these four items.

TABLE XIV

RESPONSES OF WORKSHOP APPLICANTS TO OPINIONNAIRE ITEMS 2, 10, 13 AND 16

| Item Number | SA | A | N | D | SD |
|---|---|---|---|---|---|
| 2 | 40.0* | 45.6 | 8.1 | 2.5 | 3.8 |
| 10 | 36.3 | 43.8 | 16.3 | 2.5 | 1.3 |
| 13 | 26.9 | 58.1 | 11.3 | 3.1 | 0.6 |
| 16 | 0.6 | 1.9 | 6.3 | 36.3 | 55.0 |

*Data reported in percentages

Items 2, 10 and 13 shown in Table XIV indicate a high degree of consistency that the responses are in agreement with the statements. The responses to Item 16 which is stated negatively, show a strong disagreement with the statement. These data indicate the feelings of the workshop applicants as being in agreement that aerospace education should be a vital part of the total educational plan in the State of Oklahoma.

## Research Question Number Two

Do workshop applicants feel that the Oklahoma Aerospace Education Workshops should continue providing educational experiences?

To obtain an answer to Research Question Number Two, the data of Items 23, 24 and 31 of the opinionnaire (see Appendix A) were analyzed. The responses of the workshop applicants to these three items are shwon in Table XV.

TABLE XV

RESPONSES OF WORKSHOP APPLICANTS TO OPINIONNAIRE ITEMS 23, 24 AND 31

| Item Number | SA | A | N | D | SD |
|---|---|---|---|---|---|
| 23 | 45.6* | 48.1 | 5.0 | 1.3 | 0.0 |
| 24 | 34.6 | 52.2 | 12.6 | 0.6 | 0.0 |
| 31 | 34.4 | 57.5 | 8.2 | 0.0 | 0.0 |

*Data are reported in percentages

As indicated in Table XV, the three opinionnaire items surveyed show most of the responses in the "agree" and "strongly agree" columns. An examination of the percentages indicates that the workshop applicants feel that aerospace education workshops should continue providing educational experiences.

## Research Question Number Three

Do workshop applicants feel that field trips to aerospace industries and installations are important in providing proper educational experiences?

To obtain an answer to Research Question Number Three the data of Item 3 of the opinionnaire (see Appendix A) were analyzed. Shown in Table XVI are the responses of the workshop applicants to this item.

TABLE XVI

RESPONSES OF WORKSHOP APPLICANTS TO OPINIONNAIRE ITEM 3

| Item Number | SA | A | N | D | SD |
|---|---|---|---|---|---|
| 3 | 63.1* | 31.9 | 2.5 | 2.5 | 0.0 |

*Data are reported in percentages

As reported in Table XVI, 63.1% of the responses checked "strongly agree" column. This indicates that the workshop applicants are in strong agreement that field trips to aerospace industries and installations are important in providing proper educational experiences.

## Research Question Number Four

Do workshop applicants feel that the Legislature of the State of Oklahoma should continue to provide allocations to support future aerospace education workshops?

To obtain an answer to Research Question Number Four, the data of Item 21 of the opinionnaire (see Appendix A) were analyzed. Table XVII shows the responses of the workshop applicants to this item.

TABLE XVII

RESPONSES OF WORKSHOP APPLICANTS TO OPINIONNAIRE ITEM 21

| Item Number | SA | A | N | D | SD |
|---|---|---|---|---|---|
| 21 | 25.6* | 49.4 | 19.4 | 4.4 | 1.3 |

*Data are reported in percentages

As indicated in Table XVII, opinionnaire Item 21 surveyed shows most of the responses in the "agree" and "strongly agree" columns. This indicates that 75% of the workshop applicants are in agreement that the State of Oklahoma should continue to provide allocations to support future aerospace education workshops.

# CHAPTER V

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The problem of this study was the relationship of aerospace education workshops to attitudes and certain practices of workshop participants concerning aerospace education.

To solve the problem and achieve the purpose of the study, a random sample of 200 workshop participants were assessed by means of two instruments: 1) an interview questionnaire designed to investigate certain practices employed by teachers in the teaching of aerospace concepts; and 2) an opinionnaire designed to investigate the attitudes of teachers toward aerospace education. These two instruments were also used to assess a random sample of 200 nonparticipants for the purpose of obtaining comparative data.

The population of the study consists of a total of 819 public school educators who applied for participation in one of the first four Oklahoma Aerospace Education Workshops. Of the 819 applicants, a group of 382 were selected to attend the workshop. The remaining 437 workshop applicants or nonparticipants were included in the study in order to obtain comparative data.

The mail questionnaire survey technique was used for the collection of data. The returned data were tallied on the opinionnaire and interview questionnaire, and the scores punched into computer data cards for processing by an IBM 360 computer. The returned data

amounted to 58% for the participant group and 41% for the nonparticipant group.

Ten percent of the opinionnaires and interview questionnaires sent to the nonparticipant group were returned with postal stamp indicating inability to locate the recipients, while only three percent indicated the same for the participant group.

Total scores of the opinionnaire (Appendix A) were used for testing Hypothesis One. Data for testing Hypothesis Two were derived from scores of the first 14 items in the interview questionnaire (questions 1, 2 and 3). Hypothesis Three was tested by the use of questions 4 through 10 of the interview questionnaire (Appendix B).

Research Questions 1, 2, 3 and 4 were evaluated by the data distribution of items from the opinionnaire as follows: Items 2, 10, 13 and 16 were used for evaluating Research Question #1; Items 23, 24 and 31 were used for evaluating Research Question #2; Item 3 was used for evaluating Research Question #3; and Item 24 was used to evaluate Research Question #4.

The findings of this study are summarized as follows:

1. Null Hypothesis One was rejected. Hypothesis One dealt with the relationship of workshop participation to attitudes toward aerospace education. The chi-square test indicates that workshop participation is significantly related to attitudes toward aerospace education. The computed chi-square value of 16.14 at a level of significance, ($P<0.005$) called for rejection of the null hypothesis (Table I).

2. Null Hypothesis Two was partially rejected. Hypothesis Two dealt with the relationship of workshop participation to certain practices regarding aerospace education. Findings, as indicated by

the chi-square test are as follows:

a. Participation in the workshops is not significantly related to teaching aerospace concepts: The chi-square value of 26.398 at a level of significance, ($P<0.000$) called for rejection of the null hypothesis.

b. Participation in the workshop is not significantly related to teaching a unit dealing with aerospace education: The chi-square value of 19.33 at a level of significance, ($P<0.000$) called for the rejection of the null hypothesis.

c. Participation in the workshops is not significantly related to conducting field trips to the local airport: The chi-square value of 16.050 at a level of significance, ($P<0.000$) called for the rejection of the null hypothesis.

d. Participation in the workshops is not significantly related to the utilization of the Aerospace Education Curriculum Guide: The chi-square value of 20.736 at a level of significance, ($P<0.000$) called for the rejection of the null hypothesis.

e. Participation in the workshops is not significantly related to conducting the following activities by teachers with their students, except model rocket building in which case the null hypothesis was accepted:

1) Field trips to aerospace industries and installations: The chi-square value of 19.580 at a level of significance, ($P<0.000$) called for rejection of the null hypothesis.

2) Viewing films dealing with aerospace: The chi-square value of 15.166 at a level of significance ($P<0.000$) called for rejection of the null hypothesis.

3) Utilization of aerospace resource personnel: The chi-square value of 15.650 at a level of significance, ($P<0.000$) called for rejection of the null hypothesis.

4) Utilization of aerospace resource materials: The chi-square value of 12.579 at a level of significance, ($P<0.001$) called for rejection of the null hypothesis.

5) Building of model airplanes: The chi-square value of 10.035 at a level of significance, ($P<0.010$) called for rejection of the null hypothesis.

6) Flying model airplanes: The chi-square value of 7.688 at a level of significance, ($P<0.025$) called for rejection of the null hypothesis.

7) Launching model rockets: The chi-square value of 7.958 at a level of significance, ($P<0.025$) called for rejection of the null hypothesis.

8) Paper airplane contests: The chi-square value of 13.780 at a level of significance, ($P<0.001$) called for rejection of the null hypothesis.

9) Participation in the workshops is not significantly related to student engagement in model rocket building. The chi-square value of 4.895 called for acceptance of the null hypothesis.

3. Null Hypothesis Three was accepted. There is no significant relationship between attitudes toward aerospace education and the following demographic data as it relates to the workshop applicants: sex, age, teaching experience, educational preparation, teaching level, subject matter area, and size of the community where the applicant taught. Findings, as indicated by the chi-square test are as follows:

a. There is no significant relationship between teaching level and attitudes toward aerospace education: The chi-square value of 3.329 at a level of significance, (P>0.99) called for acceptance of the null hypothesis.

b. There is no significant relationship between the sex of the workshop applicant and their attitudes toward aerospace education. The chi-square value of 1.354 at a level of significance, (P>0.900) called for acceptance of the null hypothesis.

c. There is no significant relationship between the age of the workshop applicants and their attitudes toward aerospace education: The chi-square value of 1.697 at a level of significance, (P>0.999) called for acceptance of the null hypothesis.

d. There is no significant relationship between the number of years teaching experience and attitudes towards aerospace education. The chi-square value of 10.629 at a level of significance (P>0.900) called for acceptance of the null hypothesis.

e. There is no significant relationship between the educational preparation of the workshop applicants to their attitudes toward aerospace education. The chi-square value of 11.342 at a level of significance, (P>0.250) called for acceptance of the null hypothesis.

f. There is no significant relationship between the subject matter teaching area and attitudes toward aerospace education. The chi-square value of 10.715 at a level of significance, (P>0.250) called for acceptance of the null hypothesis.

g. There is no significant relationship between the size of the community where the workshop applicants taught and their attitudes toward aerospace education. The chi-square value of 6.321 at a level

of significance, ($P>0.975$) called for acceptance of the null hypothesis.

## Conclusions

Based on the findings of this study, the following conclusions may be made:

1. Participation in at least one of the first four Oklahoma Aerospace Education Workshops is significantly related to attitudes towards aerospace education. This conclusion indicates that a well-structured and properly conducted workshop can have a positive effect on the attitudes of teachers.
2. Participation in at least one of the first four Oklahoma Aerospace Education Workshops is significantly related to practices regarding the teaching of aerospace concepts (refer to definition of terms, p. 6). The workshop activities evaluated by this study indicate a significant relationship of workshop participation to employing these activities by teachers in their teaching situations. The results of the study indicated only one of the activities (Model Rocket Building) as having an insignificant relationship. A possible explanation is that "model rocket building" is expensive and time-consuming in comparison to the other activities.
3. The test on Hypothesis Three indicates that there is no significant relationship between attitudes toward aerospace education and the following demographic data:
   a. Sex of the workshop applicant
   b. Age of the workshop applicant
   c. Teaching experience of the workshop applicant

d. Educational preparation of the workshop applicant

e. Teaching level of the workshop applicant

f. Subject matter area of the workshop applicant

g. Size of community where the workshop applicant taught.

Since the above demographic data might have been influencing factors in the evaluation of attitudes toward aerospace education, the results indicated strengthened the basis for Conclusion No. 1 and support that workshop participation is significantly related to attitudes and practices of a wide range of types of teachers regarding aerospace education.

4. An analysis of Items 2, 10, 13 and 16 of the opinionnaire indicates that the workshop applicants feel that aerospace education should be a vital part of the total educational plan in the State of Oklahoma (Table XIV, p. 44).

5. The workshop applicants feel that the Oklahoma Aerospace Education Workshops should continue providing educational experiences (Table XV, p. 45).

6. An analysis of Item 3 of the opinionnaire indicates that the workshop applicants feel that field trips to aerospace industries and installations are important in providing proper educational experiences.

7. An analysis of Item 21 of the opinionnaire indicates that the Legislature of the State of Oklahoma should continue to provide allocations to support future aerospace education workshops.

## Recommendations

While this study has established the relationship of workshop participation to attitudes and practices regarding aerospace education, it is hoped that research in this most important area of education will continue.

### Recommendations Regarding the Workshop

On the basis of the results of this study and personal observations of this writer, the following recommendations are made regarding the workshops:

1. Continue conducting aerospace education workshops in the State of Oklahoma.
2. Continue providing aerospace in-service education for all educators in the State of Oklahoma.
3. The structure of the workshop should remain in its present form, but more emphasis should be given to methodology of teaching aerospace concepts. Classroom instruction should be activity-oriented, so that the teachers may acquire greater confidence in conducting aerospace classroom activities with their students.

### Recommendations for Workshop Follow-up

As has been shown in this study and the study conducted by Miller (1972), the first four Oklahoma Aerospace Education Workshops were successful, but in order to take full advantage of the enrichment brought about as a result of the workshops, it is recommended that a 12-hour aerospace in-service institute be held at various central

locations throughout the State of Oklahoma so that participant educators may be helped with instituting aerospace education in their schools.

Recommendations for Further Research

It is recommended that a causal study be conducted to determine the effectiveness of the workshop.

It is suggested that the objectives of the workshop be stated behaviorally so that criteria for highly reliable measurement may be established and an attempt be made to measure effects that the workshops have brought about in the participants' students.

It is also recommended that evaluation of the workshop continue as a matter of procedure. Long range evaluation of the workshop would be helpful for re-structuring and making changes as the need arises.

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# APPENDIX A

## APPLICANT OPINIONNAIRE

# OPINIONNAIRE

Leaders in science education stress the importance of concepts, scientific method and attitudes. While progress has been made in most of these areas, much work must be directed toward the development of positive attitudes toward science. The term "attitude" used in this opinionnaire refers to how an individual feels about science--an emotionalized feeling for or against.

This opinionnaire is designed to measure how you feel about aerospace education. Please indicate your feelings by marking the response which indicates the degree with which you agree or disagree with each statement.

TABLE

SA - Strongly Agree
A - Agree
N- Neutral
D - Disagree
SD - Strongly Disagree

Example:

| | SA | A | N | D | SD |
|---|---|---|---|---|---|
| Airline pilots are interesting people. | = | = | (=) | = | = |

Note that "N - Neutral" is marked, indicating neither agreement nor disagreement.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. Aerospace education is unrelated to life experiences. | = | = | = | = | = | (1) |
| 2. Aerospace education concepts should be taught at all levels of school. | = | = | = | = | = | (2) |
| 3. Field trips to airports and aircraft industries can make subject matter interesting. | = | = | = | = | = | (3) |
| 4. Aerospace education concepts are too difficult to teach at my grade level. | = | = | = | = | = | (4) |
| 5. Possibilities for student participation make aerospace education an interesting topic. | = | = | = | = | = | (5) |
| 6. The study of aerospace education does not bore me, but I would never pursue it independently. | = | = | = | = | = | (6) |

| | | SA | A | N | D | SD | |
|---|---|---|---|---|---|---|---|
| 7. | It is fascinating to study the fundamentals of flight in the classroom. | = | = | = | = | = | (7) |
| 8. | I am as interested in learning about space flight now as I was three years ago. | = | = | = | = | = | (8) |
| 9. | I am afraid of the thought of having to teach a unit on human factors in space flight. | = | = | = | = | = | (9) |
| 10. | Aerospace education is a must at this "time". | = | = | = | = | = | (10) |
| 11. | Aerospace technology is something that can improve every day living. | = | = | = | = | = | (11) |
| 12. | Aerospace education is very important in this scientific age in which we live. | = | = | = | = | = | (12) |
| 13. | Aerospace education can be related to all areas of the curriculum. | = | = | = | = | = | (13) |
| 14. | Courses I took in undergraduate school influence my teaching of aerospace. | = | = | = | = | = | (14) |
| 15. | I feel that my present background is sufficient for teaching aerospace education. | = | = | = | = | = | (15) |
| 16. | I would like to see aerospace education dropped from the curriculum. | = | = | = | = | = | (16) |
| 17. | I would like to teach my students aerospace education concepts but they are too difficult and confusing. | = | = | = | = | = | (17) |
| 18. | I would like to teach some aerospace education units but I am afraid I do not have sufficient background. | = | = | = | = | = | (18) |
| 19. | Aerospace education has no place in primary levels of schools. | = | = | = | = | = | (19) |
| 20. | I am now teaching more aerospace education concepts than I did three years ago. | = | = | = | = | = | (20) |
| 21. | The legislature should provide funds in order to train aerospace education teachers. | = | = | = | = | = | (21) |

| | | SA | A | N | D | SD | |
|---|---|---|---|---|---|---|---|
| 22. | My supervisor or principal shows a decided interest in aerospace education. | = | = | = | = | = | (22) |
| 23. | I am always interested in learning more about aerospace. | = | = | = | = | = | (23) |
| 24. | I wish I had been given more aerospace instruction in school. | = | = | = | = | = | (24) |
| 25. | Society can best influence the direction of aerospace technology by educating citizens to be alert to the potential benefits as well as the harmful effects of aerospace technology. | = | = | = | = | = | (25) |
| 26. | Aerospace technology is too complicated for the average citizen to understand and appreciate. | = | = | = | = | = | (26) |
| 27. | Aerospace education can make the educational program more realistic and futuristic for the student. | = | = | = | = | = | (27) |
| 28. | Aerospace education can affect the quality of the educational product in a positive manner. | = | = | = | = | = | (28) |
| 29. | Aerospace education can stimulate the spirit of inquiry so essential to continuous growth. | = | = | = | = | = | (29) |
| 30. | Aerospace education can stimulate awareness of available aerospace careers. | = | = | = | = | = | (30) |
| 31. | Aerospace education provides an opportunity to supplement classroom instruction with rewarding education experiences. | = | = | = | = | = | (31) |

# APPENDIX B

# APPLICANT QUESTIONNAIRE

# QUESTIONNAIRE

In the following items mark the appropriate column.

| | YES | NO | |
|---|---|---|---|
| 1. I now attempt to teach aerospace education concepts. | = | = | (1) |

If "yes", then please check appropriate blank.

_____ 29 minutes or less per week

_____ 30 - 59 minutes per week

_____ 60 - 119 minutes per week

_____ 120 - 179 minutes per week

_____ 180 minutes or longer per week

| | | | |
|---|---|---|---|
| 2. I am presently teaching or have taught a unit dealing with aerospace education. | = | = | (2) |
| If your answer is "yes", please mark the following. | | | |
| a. I have or am planning a field trip in connection with the unit. | = | = | (a) |
| b. I have had or plan to have a resource person into the classroom. | = | = | (b) |
| c. I have used films or plan to use films. | = | = | (c) |
| d. Students are using resource materials other than the text. | = | = | (d) |
| e. Enough material is in our textbook to teach the unit. | = | = | (e) |
| f. A local airport is a part of field trip activity. | = | = | (f) |
| g. Students have or will be engaged in the following activities: | | | |
| (1) Building model airplanes. | = | = | (g1) |
| (2) Flying model airplanes. | = | = | (g2) |
| (3) Building model rockets. | = | = | (g3) |
| (4) Launching model rockets. | = | = | (g4) |
| (5) Paper airplane contests. | = | = | (g5) |

| | | YES | NO | |
|---|---|---|---|---|
| h. | I am now using the aerospace education curriculum guide prepared by the State Aerospace Education Committee and the Oklahoma Curriculum Improvement Commission in cooperation with the Oklahoma Aeronautics Commission. | = | = | (h) |

If your answer to question 2 was "no", please respond to the following statements.

| | | | | |
|---|---|---|---|---|
| i. | Students find aerospace education to be non-interesting. | = | = | (i) |
| j. | My building principal does not approve of this type of activity. | = | = | (j) |
| k. | I see no sound educational value to such a course. | = | = | (k) |
| l. | Time and space are not adequate for such a course. | = | = | (l) |
| m. | I do not have enough science background for such a course. | = | = | (m) |

3. I have attended an aerospace workshop sponsored by the Oklahoma State Department of Education and the Oklahoma Aeronautics Commission. = = (3)

If "yes", then please check the appropriate blank.

_____ 1969

_____ 1970

_____ 1971

_____ 1972

In the following statements please place an (X) in the appropriate blank:

4. At what level have you had most of your teaching experience?

_____ K - 3

_____ 4 - 6

_____ 7 - 9

_____ 10 - 12

_____ Other (Please state) _____

5. Sex.

_____ Male

_____ Female

6. Your present age.

_____ 60 or over

_____ 50 - 59

_____ 40 - 49

_____ 30 - 39

_____ 26 - 29

_____ under 25

7. Years of teaching experience, including the current year.

_____ 1 - 3

_____ 4 - 6

_____ 7 - 9

_____ 10 - 12

_____ 13 - 15

_____ 16 - 18

_____ 19 or more

8. Highest earned degree:

_____ Associate

_____ Bachelor's Degree

_____ Master's Degree

_____ Doctorate

_____ Other (Please state) _____

9. With which area are you most closely associated:

_____ Science

_____ Mathematics

_____ Language Arts

_____ Social Science

_____ Humanities

_____ Vocational and/or Technical

10. Community in which you now teach could best be described as:

_____ Metropolitan - inner city (Oklahoma City or Tulsa)

_____ Suburban - Metropolitan (Oklahoma City or Tulsa)

_____ City other than suburban, population 25,000 - 100,000

_____ City other than suburban, population 5,000 - 9,999

_____ City other than suburban, population less than 5,000

# APPENDIX C

## COVER LETTER TO APPLICANT

**OKLAHOMA AERONAUTICS COMMISSION**

424 UNITED FOUNDERS TOWER (405) 521-2377
OKLAHOMA CITY OKLAHOMA 73112

DAVID HALL
GOVERNOR

COMMISSIONERS

G. S. ATKINSON, OKLAHOMA CITY, CHAIRMAN
GERALD "SOC" NELSON, GUTHRIE, VICE-CHAIRMAN
TERRENCE E. TURNER, FREEDOM, SECRETARY
LOWELL D. CLARK, OKLAHOMA CITY
WILLIAM (JOE) CUNNINGHAM, TAHLEQUAH
REX H. MADEIRA, LAWTON

KEITH W. LUTZ, DIRECTOR
W. HOWARD CLOUD, DEPUTY DIRECTOR

February 19, 1973

Dear Fellow Educator:

During the past four years the Oklahoma Aeronautics Commission and the State Department of Education have conducted workshops in Aerospace Education for teachers. Present plans call for another workshop during the coming summer.

In order to plan the workshop to more nearly meet the needs of teachers, we are requesting a random sample of teachers who have applied for the workshop in the past to complete the enclosed short questionnaire. Simply staple the corners and return as soon as possible. Postage has been paid.

The information will be compiled by Mr. Chris Romero, a member of Dr. Wiggins' staff, and used by the Governor's Aerospace Education Committee in developing specific plans for the coming workshop.

We sincerely appreciate your cooperation.

Gerald W. "Soc" Nelson
Gerald W. "Soc" Nelson, Chairman
Oklahoma Aeronautics Commission

Kenneth E. Wiggins
Kenneth E. Wiggins
Project Director

Enclosure

# APPENDIX D

## FOLLOW-UP LETTER TO NONPARTICIPANTS

OKLAHOMA STATE UNIVERSITY • STILLWATER

Research Foundation
(405) 372-6211, Ext. 271

74074

April 4, 1973

Dear Fellow Educator:

On February 19 you were mailed a short questionnaire concerning aerospace workshops in Oklahoma. You were asked to complete the questionnaire and return to our office.

In view of the fact that anonymity was assured, we do not know who has returned and who has not. If you did complete and return the questionnaire, would you please simply return the questionnaire blank. If you did not complete it, would you please take the few minutes necessary and return by April 27. (NO POSTAGE NECESSARY.)

We are most anxious to include your feelings in our planning for the workshop this summer.

Sincerely,

Kenneth E. Wiggins
Workshop Director

KEW:sk

Enc.

# APPENDIX E

## HISTORICAL DEVELOPMENT OF THE OKLAHOMA AEROSPACE EDUCATION WORKSHOP

The Governor's Committee on Air Education was divided into five subcommittees and were charged with the following responsibilities (Minutes, August 17, 1968).

Curriculum and Materials Committee

This committee shall make comprehensive recommendations concerning the curriculum or curricula which may be adopted by Oklahoma secondary schools. It shall also make recommendations concerning the materials which may be required for use by students taking air education such as plotters, computers, and textbooks. The committee shall give consideration to the current requirement for air education courses which specify that such courses will last a full nine months. The committee shall gauge the capacity of students to acquire sufficient knowledge to pass the FAA ground school examination and whether or not this can be done in one semester. If this they believe, they should consider whether or not an aviation history course should be given the first semester to be followed by ground school course leading to FAA examination in the second semester.

Accreditation Committee

This committee shall make recommendations concerning the current standard of accreditation for teachers of air education at the secondary level. It shall ascertain whether or not in its opinion recent acquisition of a private pilot's license or successful completion of the FAA ground school examination should also result in accreditation if the teacher meets other state standards. It should investigate the question of a policy regarding the waiver of current requirements of

air education courses lasting a full nine months or the possible creation of a credit of one half unit and permitting such courses to last only one semester. It shall also recommend a policy of waivers to allow some schools to permit air education where current standards may work a hardship on the school desiring to teach such courses.

Legislative Committee

This committee shall work with the Governor and the Legislature to propose, compose and seek to pass legislation which shall assist the development of air education interest in Oklahoma. It shall act, where required, in order to implement the recommendations of the various subcommittees by seeking to enact legislation which seems compatible with those recommendations.

Funding Committee

This committee shall have as its primary function the investigation of whether or not state monies may be required for the implementation of recommendations of the various subcommittees. If state monies are deemed necessary, it shall recommend to the Legislative Committee what legislative action may be required. The committee shall also investigate private sources of revenue which may be forthcoming for the purpose of stimulating air education in Oklahoma. It shall also work closely with the Teachers Workshop Committee to ascertain whether or not attendance by teachers at such workshop may or may not work a financial hardship upon them for such study, whereas study in their chosen field may be remunerative.

Teacher Workshop Committee

This committee shall have as its function, the surveying of current facilities available for qualifying Oklahoma teachers for air education subjects. It shall make a determination as to how long such workshops should last--possible means of financing such workshops--possible means of financing attendance by teachers at such workshops. It shall make recommendations as to the material to be covered in such workshops and the materials necessary for such workshops. It shall prepare, to the best of its availability, an estimate of the number of teachers which might attend such workshops and prepare such an estimate on a five-year basis to allow for increases in each of those five years. It shall coordinate with the Accreditation and Materials Committee so that an appropriate certificate of accreditation may be issued by the State Department of Education (Governor's Air Education Committee, 1968).

On October 2, 1968, the Legislative Subcommittee of the Governor's Air Education Committee met and discussed the report of the Curriculum Subcommittee and its recommendation of asking $15,000 from the Legislature to implement the teacher workshop program during the summer of 1969.

The Chairman of the Governor's Air Education Committee who was also a staff member of the Oklahoma State Department of Education stated that the State Board was desirous of assisting the program in any possible way provided the program was feasible. He pointed out the necessity of materials and guide lines to maintain student interest.

Following a general discussion, funding for such a program was

declared necessary. It was moved that the necessary preparations be made, with the Governor's approval, for the submission to the Legislative Council of a proposed bill which would embrace the following areas:

(a) $15,000 for teacher workshops in the summer of 1969, with the provision that a like sum or more be raised from private and philanthropic sources;

(b) $20,000 for preparing and publishing classroom material for air education courses from kindergarten through high school (Minutes, Oct. 2, 1968).

On October 14, 1968, the subcommittees on funding of the Governor's Air Education Committee convened and a discussion ensued of the recommendations by the Legislative Committee to request the Legislature for $15,000 for the Teacher Workshop Program. The consensus was that the state should bear at least one-half the financial burden of workshops.

A motion was made and passed unanimously that the Legislature be asked to appropriate $17,500 for the program and that an equal amount of $17,500 be raised from other sources for the program.

It was suggested that all monies raised be donated to the Oklahoma Economic Development Foundation which in turn would remit these funds to the Oklahoma Aeronautics Commission.

The question of providing an additional stimulus for the teachers attending the workshop was discussed. There was an agreement that an additional incentive could be provided if a trip to Houston to tour the Space Center or a visit to Cape Kennedy could be arranged.

As to the problem of raising money from outside sources, it was agreed that each committee member would provide a list of potential

donors. This list could include major oil companies which sell aviation products in Oklahoma, some of the larger aviation companies as well as some of the fixed base operators (Minutes, Oct. 14, 1968).

On October 17, 1968, the Teacher Workshop Subcommittee of the Governor's Air Education Committee was called for the purpose of formulating plans for the teacher workshop.

It was moved and seconded that a three-week workshop be planned for the summer of 1969. The workshop would be limited to one-hundred teachers who are residents of Oklahoma. It was also passed that the workshop be held in a central location but that graduate credit and enrollment be permitted at the various colleges in Oklahoma (Minutes, Oct. 17, 1968).

The Teacher Workshop Subcommittee of the Governor's Air Education Committee met for the second time on October 30, 1968. It was reported that the Teachers' Air Education Workshop could be offered at one institution and the credit from the workshop could be transferred to any state college or university. It was decided at this meeting that the workshop would be for a three week duration and that three hours graduate credit be awarded for this course.

The opinion of the committee was that 15 of the 100 teachers chosen for the workshop be given extra training in order to develop future teachers for workshops.

The committee approved the dates of July 7, 1969, through July 25, 1969, for the workshop, with the tentative program to be as follows:

| | | |
|---|---|---|
| Monday | July 7 | Registration and Orientation |
| Tuesday | July 8 | Lectures and Banquet |
| Wednesday | July 9 | FAA field trip to Center--Aero Commander--FAA GADO |

| | | |
|---|---|---|
| Thursday | July 10 | Morning - briefing on NASA<br>Afternoon - trip to Houston |
| Friday | July 11 | NASA field trip |
| Monday | July 14 | Full session in the morning<br>Elementary and secondary in the afternoon<br>(Introducing Air Education in the Classroom) |
| Tuesday | July 15 | Tulsa, Ardmore, Durant (combination trips) |
| Wednesday | July 16 | Tulsa, Ardmore, Durant (combination trips) |
| Thursday | July 17 | Industry preparation - set stage for work on curriculum, Aviation Representatives: Cessna; Beechcraft; Boeing; Piper; etc. |
| Friday | July 18 | Tinker AFB and RAPCOM field trip |
| Monday thru Friday | July 21 thru July 25 | Planning actual curriculum (sic) with the meetings to convene at 10:00 a.m. and adjourn at 2:00 p.m. |

The motion was made and seconded that the workshop be held at Oklahoma State University. The motion was passed unanimously (Minutes, Oct. 17, 1968).

The first meeting of the Executive Committee of the Governor's Air Education Committee was called on November 7, 1968.

It was agreed that the Air Education Program be funded in the amount of $60,000, $15,000 of which would come from outside sources and another $45,000 to be sought by Legislative appropriation.

There was agreement to entitle the course at Oklahoma State University the "Master Teacher Workshop for Air Education."

It was decided that the Master Teacher Workshop for Air Education should have clearly defined dual purposes which shall be:

A. To qualify 100 teachers in the program of instruction of "Aerospace and You".

B. To prepare a guidance outline and formulate a policy for

passing on this information through the conference Teacher Workshops on Air Education (Minutes, Nov., 1968).

During the first session of the 32nd Legislature, Senate Bill Number 56, by McSpadden and Massey of the Senate and Willis and Miskelly of the House was introduced. This bill was for the appropriation of the sum of two hundred fifty five thousand dollars ($255,000) of which $45,000 was to be allocated for the Teachers' Workshop Program.

On February 19, 1969, the Teacher Workshop Committee convened. It was suggested by the director of the Oklahoma Aeronautics Commission that the committee begin raising the necessary $15,000 for the workshop from outside sources in order to have some operating capital while waiting on the results of Senate Bill 56.

April 8, was set for the screening committee to meet for the purpose of selecting the 100 elementary and secondary teachers to attend the workshop. It was decided that the screening committee include all members of the workshop committee. Mailing of applications to all teachers were to be accomplished through the mailing list of the Oklahoma State Department of Education.

The selection of the 100 teacher participants will be based on:

a. Geographic Location

b. Thirty Elementary Teachers

c. Thirty Junior High Teachers

d. Thirty Senior High Teachers

e. Ten Administrators

f. Expressed Interest of the Local Administration in Establishing Air Education.

There was agreement of the committee that a curriculum guide for Air Education would be one of the outcomes of the first Teacher Education Workshop in Air Education (Minutes, Nov. 7, 1969).

VITA

Joe Christian Romero

Candidate for the Degree of

Doctor of Education

Thesis: THE RELATIONSHIP OF AEROSPACE EDUCATION WORKSHOPS TO PRACTICES AND ATTITUDES OF PARTICIPATING TEACHERS

Major Field: Higher Education

Biographical:

Personal Data: Born in Cleveland, New Mexico, October 17, 1937, the son of Mr. and Mrs. Moises Romero.

Education: Graduated from Santa Fe High School, Santa, Fe, New Mexico, in May, 1956; received Bachelor of Science degree in Chemistry from College of Santa Fe in 1965; received Master of Science Teaching degree in Science Education from New Mexico Institute of Mining and Technology in 1971; enrolled in doctoral program in 1971 and completed requirements for the Doctor of Education degree at Oklahoma State University in December, 1973.

Professional Experience: Chemist, Eberline Nuclear Science, 1965-1966; Science and Math Teacher, Mora High School, 1966-1968; Science and Math Teacher, Jemez Springs High School, 1968-1970; Instructor of Space Science Education, Oklahoma State University, 1970-1971; Graduate Assistant, Oklahoma State University, Educational Research Foundation, 1971-1973.