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Apparent effects of aerospace education workshops in selected Montana classrooms as evidenced by pupils' vocational aspirations and responses in free writing experiences

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APPARENT EFFECTS OF AEROSPACE EDUCATION WORKSHOPS IN SELECTED MONTANA CLASSROOMS AS EVIDENCED BY PUPILS' VOCATIONAL ASPIRATIONS AND RESPONSES IN FREE WRITING EXPERIENCES

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INTRODUCTION

Background

Specialized summer courses in aviation and aerospace education for teachers have been offered in one or more colleges in Montana since 1953. Sponsors have been one or more of the following: Montana Aeronautics Commission, State Department of Public Instruction, colleges and universities. These courses grew out of a national concern that teachers were inadequately prepared to teach understandings related to living in an air and space age.

In a statement prefacing the Report on Air Education Workshops, 1954, Frank Wiley, Director, Montana Aeronautics Commission, said:

> In fifty years the aviation industry has developed into the most important influence in the lives of the people of our times. Distance has shrunk until the people of all countries of the world are our next door neighbors. Living standards and national security are changed in one generation by the versatility of the airplane.
>
> The aviation industry employs more people in the United States than any other activity with the automobile industry and the steel industry ranking second and third.
>
> The continued development of aviation, our security, and our economy depends upon the establishment and

> maintenance of a large resource pool of personnel trained in every technical science.[1]

Stating that separate courses at the secondary level were not practical, Wiley continued:

> It is more desirable to integrate aviation material into existing courses at all levels of education.
>
> It is the responsibility of educators to have a general knowledge of aviation so that the teacher may prepare students for technical specialized training and the environment in which we now live.
>
> The Montana Aeronautics Commission is working with the State Department of Public Instruction and units of the University of Montana in sponsoring aviation education clinics for summer school teachers.
>
> The purpose of these clinics is (1) to give teachers a general background of aviation knowledge, and (2) to make available to teachers information on sources of aviation material which may be integrated into existing school curriculum at all levels.[2]

Aviation education workshops in Montana colleges and universities have attempted to provide teachers, especially elementary teachers, with the knowledge, experiences, and understandings that would enable them to integrate aviation education into their classroom teaching.

The Problem

Records about aviation education workshop participants were kept in the office of the Superintendent of

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[1] Report on Air Education Workshops, 1954 (Helena, Mont.: Montana Aeronautics Commission, 1955), p. 1.

[2] Ibid.

Public Instruction, and data was compiled relating to the teachers' acceptance of the workshops. However, no studies have been made in Montana to determine any apparent effects upon children's learnings from instruction by aviation-oriented teachers. The purpose for conducting this study has been to attempt to determine whether children's behavior has been affected as a result of being in classrooms taught by teachers who have participated in the workshops. In seeking answers to this question, it appeared desirable to determine whether some specific effects could be detected through children's verbalizations. Therefore, this study focused on these specific problems:

1. Do children in classrooms whose teachers have attended an aerospace education workshop (hereafter referred to as Group A) exhibit knowledge and understanding of terms related to aerospace that is greater than, similar to, or less than that of children in classrooms whose teachers have not attended such a workshop (hereafter referred to as Group B)?

2. Do children in Group A state career choices that are peculiar to or related to aerospace more frequently than, less frequently than, or with similar frequency to children in Group B?

The study was confined to second, third, and fourth grades in two cities, as follows: second and third grades Group A and Group B in Deer Lodge elementary schools, Deer Lodge, Montana; and fourth grade Group A at Washington School, Group B at Lincoln School, Anaconda, Montana.

Definitions of Important Terms

Aviation education. "Aviation education is that branch of general education concerned with communicating knowledge, skills, and attitudes about aviation and its impact upon society."[3]

Aerospace education. Subsequent to Strickler's definition, the nature of technology stemming from aviation changed drastically; the launching of the Russian Sputnik in 1957 and subsequent manned space flight gave rise to a combination of terms meant to deal with flight within as well as outside of the earth's atmosphere, and related fields. The term "aerospace education" embraces the same general meanings and concepts attributed to aviation

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[3]Mervin K. Strickler, Jr., "The Air Center as a Means of Implementing Aviation Education" (unpublished Doctor's dissertation, Stanford University, 1951), p. 162.

education, except expanded to include space flight and technology.

Aviation education workshop.

> Formal aviation education, credit-bearing instruction conducted for at least one continuous week's duration by colleges and universities under the title of aviation education (or similar title such as Air Age Education Workshop or Air and Space Education Workshop).[4]

Free-writing task. A voluntary writing experience on a subject concerning which students had not been pre-informed, and for which no previous specific instruction had been given.

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[4]Walter Zaharevitz, "Curricular Experiences for a Summer Aviation Education Workshop" (unpublished Master's thesis, Miami University, 1959), p. 9.

Chapter 2

REVIEW OF THE LITERATURE

A search for previous studies in aviation education with relevance to this study revealed three dissertations.

Pivotal to the field, and the first doctoral dissertation in aviation education, was Strickler's study in 1951. In this comprehensive work, he defined and distinguished between aviation education and aeronautical education:

> 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 aeronautical education which is concerned with training specialized aviation workers.[1]

Strickler's work also traced the historical development of aviation education from its beginnings in 1908, and described an air center with regard to definition, types, services rendered, groups served, and its place in aviation education.[2]

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[1] Mervin K. Strickler, Jr., "The Air Center as a Means of Implementing Aviation Education" (unpublished Doctor's dissertation, Stanford University, 1951), p. 162.

[2] Ibid.

Pawelek, in his effort to determine the extent of offerings and activities in aviation education in the United States, found: (1) teacher training to be a critical issue in this area; and (2) aviation education has entered the school curricula in two forms: separate aeronautics courses, and fusion of aviation content into existing courses.[3]

Brewer's study was directed toward evaluation of the Tennessee aviation education workshops, particularly by means of measurable changes in teachers. He found:

> that aviation education workshops have brought about changes in teachers as follows: (1) attitudes concerning the role of aviation in education, (2) attitudes toward the role of aviation in society, and (3) knowledge of aviation principles.[4]

Brewer's evidence showed that "approximately three fourths of all teachers surveyed were meeting the stated educational needs of children to some extent through the utilization of aviation-related material and activities."[5]

Concerning methods of presenting aviation-related material, Brewer said:

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[3]Alan R. Pawelek, "Air Age Education" (unpublished Doctor's dissertation, University of Minnesota, 1960).

[4]A. C. Brewer, An Evaluation of the Effectiveness of Selected Aviation Education Workshops in Tennessee (Nashville: Tennessee Aeronautics Commission, 1960), p. 76.

[5]Ibid., p. 71.

> It becomes apparent that the method of presentation is a matter of coice, dependent upon purpose. If the aim is to bring about an awareness of the many facets of aviation and its implications, it would seem advisable to develop specific units in aviation. Conversely, if the teachers were striving for depth of understanding in fewer areas, those learnings would take on more meaning when seen in context with other materials, or in other instructional areas.[6]

Brewer also presented evidence that pupils of teachers surveyed displayed growth in the following:

1. Knowledge of aviation-related facts.
2. Interest in aviation-related vocations.
3. Interest in education as a profession.
4. Breadth of interest in aviation.[7]

Other significant conclusions from Brewer's study are: (1) teachers ranging in age from 40-48 are less likely than any other age groups to change their opinions on aviation-related concepts; (2) women constitute a larger proportion of the inflexible group than do men; (3) elementary and high school teachers constitute a larger proportion of the inflexible element than do college administrators or junior high teacher groups; (4) elementary teachers have a lesser grasp of fundamental aviation-related facts than do other groups.

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[6]Ibid., pp. 72-73.

[7]Ibid., p. 77.

[8]Ibid., p. 78.

The importance of aviation education to the accomplishment of overall educational aims, the issue of teacher training in aviation education understandings, and reasons for inclusion of aviation-related materials in the schools' curricula are important recurring themes in the literature. Mehrens touched on all of these in a study involving thirty-two of the nations's largest school systems:

> (It was) discovered that aviation education can reinforce certain major trends in curricular improvement. These trends are defined in terms of the nature of learning and the responsibilities of the schools, as follows: (1) Recognition of interest, purpose, and guided experiences in relation to child growth and development. (2) Recognition of responsibility toward: a. the child's development in understanding the complexity of modern life; b. his development of skills and attitudes essential to its improvement; and c. the students' vocational efficiency. (3) Acceptance of a more integrated organization of the curriculum and the use of the large center of interest as a frame of reference. (4) Greater use of community resources. (5) Recognition of a responsibility for in-service teacher training.[9]

Mehrens' strongly stated conclusion has been accepted generally as the philosophy for elementary aviation education:

> To enrich the school's general education program through the use of aviation materials or the materials brought into being by similar significant developments is to apply what is known of child growth and development in

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[9]H. E. Mehrens (ed.), Adventures in Aviation Education (Washington, D.C.: American Council on Education, 1951), p. 2.

> terms of the accepted purposes of general education. Aviation education has no method other than the general method of education. It has no problem apart from the general problem of education. However, the aviation education movement does emphasize existing educational needs and problems.[10]

The view held by many educators that responsibility for the advancement of aviation education lies with those responsible for general education is shared by leaders in the aviation industries. Typical of these views is the declaration by C. R. Smith, Chairman of the Board, American Airlines:

> Since public policies are an end-product of education, it is the responsibility of educators to be progressive and create methods which will have as their result an informed public, requiring appropriate policies for the utility and growth of air transportation. . . . The policy will be that much stronger if it reflects the leadership of sensibly educated men and women.[11]

In the same vein, Ogburn affirmed the viewpoint that "since our culture will include aviation, it will be necessary for educators to reformulate educational programs in the light of this new development."[12] Ogburn recognized the directions that were being taken with regard to inclusion of

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[10]Ibid., p. 17.

[11]C. R. Smith, in an address at the World Congress on Air Age Education, Proceedings and Abstracts of Speeches, August 21 to August 28, 1946 (New York: Air Age Education Research, 1946), p. 23.

[12]William F. Ogburn, The Social Effects of Aviation (Cambridge: The Riverside Press, 1946), p. 443.

aviation education in the curricula when he said, "In March 1945, it was reported that at least nine state departments had already issued courses of study in aviation education extending from kindergarten through junior college."[13]

Further evidence gained through search of educational literature indicates that the problem of inclusion of aviation-related material in lower elementary grades was addressed by some educators. An Air Age Education Series published in 1942 stated these two purposes:

> (1) To provide text and teaching materials for older students in high schools in the field of pre-flight aeronautics; and (2) To provide pertinent aviation materials which may be woven into existing courses in the curricula of the secondary schools and wherever feasible, of the elementary schools.[14]

Three of the earliest aviation-related materials designed specifically for use by teachers at elementary level were produced in 1935. One was a grade three unit entitled Aviation, by Lillian Kotter.[15] A second, entitled The Evolution of Common Things: Unit 1: Aviation, by Myra

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[13]Ibid.

[14]Charles K. Arey, Elementary School Science for the Air Age, Air Age Education Series (New York: Macmillan Co., 1942), p. i.

[15]Lillian Kotter, Aviation, Teachers' Lesson Unit Series #78 (New York: Teachers College, Columbia University, 1935).

Schuck, was worked out with a group of rapid learners in an experimental school.[16] The third, by Adah Shuflin, was entitled Air Meet, a unit on aviation for grade one.[17]

Relating aviation education to contemporary educational practices, Brewer et al., in Curriculum Guide for Aviation Education, stated the challenge:

> Man's discovery of how to make use of the air as a medium of transportation, and the train of events this discovery has brought about have created great social, economic, and political changes. Moreover, the end of these changes is not in sight. Aviation's impact continues each day to introduce new factors into our lives. . . . It is generally recognized that the schools, if they are to fulfill their purposes, must take into account whatever social changes occur over a period of time.[18]

Aviation is seen by many educators as having value as a motivational factor for learning. Blough and Campbell state:

> No one doubts the impact that air travel and airplane development have had on our civilization. Experience with elementary school pupils indicates conclusively that they are excited about airplanes and are full of

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[16]Myra I. Schuck, The Evolution of Common Things: Unit 1: Aviation (New York: Board of Education, 1937).

[17]Adah E. Shuflin, Air Meet, Teachers' Lesson Unit Series #83 (New York: Teachers College, Columbia University, 1935).

[18]A. C. Brewer, Georgia Robinson, and Ruth Thomas (eds.), Curriculum Guide for Aviation Education (Knoxville: Tennessee Aeronautics Commission, 1958), p. 9.

questions about them.[19]

It is recognized that children's interests are strong motivational factors in their learning, and that among their chief interests is the subject of aviation, as revealed in a study by Baker. In her study of children's questions having implications for planning the curriculum, Baker said:

> Categories (of questions) are not to be thought of as units of studies. Instead they may be thought of as areas of learning with which teachers of grades 3 to 6 need to be acquainted if they would foster the inquiring mind in children. . . . if teachers are to live in the world in which the children live, they must be intelligent and well-informed.[20]

Baker found that travel and transportation ranked in the upper third of categories in numbers of questions asked in all grades. Travel and transportation ranked in the upper third of categories in numbers of questions asked in all grades. Travel and transportation ranked fourth in major categories in both grades three and four in numbers of questions asked. A significant number of questions pertained specifically to aircraft and how they

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[19]Glen O. Blough and William Campbell, Making and Using Classroom Science Materials (New York: Dryden Press, 1954), p. 118.

[20]Emily V. Baker, Children's Questions and Their Implications for Planning the Curriculum (New York: Teachers College, Columbia University, 1945), p. 141.

fly.[21]

Baker also stated implications for teacher-training when she said, "To deal with the children's rising interest in energy as expressed in their questions about electricity, aviation, the radio and other means of communication, the teachers' preparation was most meager."[22]

The importance of the teachers' role in the make-up of the children's curricular experiences is unequivocally stated by Freeman et al., "The teacher determines the quality of the educative experiences provided the children."[23]

Brewer et al. reinforced this view:

> The nature of the classroom activities in which students are involved determine whether or not goals of formal education are achieved. . . . In order to guide students properly, teachers and instructors must understand that the contemporary world is a dynamic world in every sense of the term. . . . A teacher not only should become informed of current aviation events, but also should understand the nature and scope of the sociological effects of such events. Moreover, she must be able to direct student attention toward such events and their effects when these are relevant to student purposes.[24]

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[21]Ibid., pp. 141-151.

[22]Ibid., p. 151.

[23]Kenneth Freeman and others, Helping Children Understand Science (Philadelphia: John C. Winston Co., 1958), p. 11.

[24]Brewer, op. cit., pp. 11-12.

The same authors recommended that "every teacher capitalize on the natural interest of children in aviation. The teachers who do this will find in aviation an important means for motivating student learnings in the basic skills and attitudes."[25]

An appreciation for, or an awareness of, vocational and career aspects is considered appropriate to be included in elementary level aviation education. Brewer et al. did not treat vocational goals independently, but stressed the fact that:

> Even at the primary level some vocational guidance may be given. It is not too early to begin to help children think about careers. Since aviation is America's number one employer, incorporated within certain learning activities suggested are pupil tasks which may help each child develop understandings of how people earn their living in the air age.[26]

Concerning the effect of classroom experiences on the child, Mehrens said:

> The child in the primary grades gained a very general knowledge of his social and physical environment. These understandings, in each instance, included the airplane as a phenomenon of his world.[27]

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[25]Ibid., p. 17.

[26]Ibid.

[27]Mehrens, op. cit., p. 7.

Chapter 3

DESCRIPTION OF PROCEDURES

Gathering the Data

An attempt was made in this study to determine whether children's behavior was affected as a result of being in classrooms taught by teachers who have participated in aerospace education workshops. Specific effects were sought in children's verbal responses, as follows:

1. Do children in classrooms whose teachers have attended an aerospace education workshop (referred to as Group A) exhibit knowledge and understanding of terms related to aerospace that is greater than, similar to, or less than that of children in classrooms whose teachers have not attended such a workshop (referred to as Group B)?

2. Do children in Group A state career choices that are peculiar to or related to aerospace more frequently than, less frequently than, or with similar frequency to children in Group B?

Group A classrooms selected for this study had to exhibit certain characteristics:

1. They had to be in public Montana schools.
2. They had to be within the first four elementary grades.
3. Administrative approval to conduct the study within the selected classrooms had to be obtained, as did teacher approval.
4. Teachers in the previous grades must have attended a Montana aviation education workshop within the preceding two to four years.

Except regarding teacher participation in an aviation education course, Group B classrooms were selected as being roughly similar to Group A classrooms.

1. Group B had about the same number of children in each class and grade level as Group A.
2. They were heterogeneously grouped.
3. They had similar educational and cultural experiences, derived from living in the same communities, attending schools in the same districts, and being exposed to the same communications media.

Lists of teachers who had within the prescribed time attended aviation education workshops were obtained from the office of the State Superintendent, Helena, Montana.

From these lists five teachers representing two schools in each of two cities were identified as meeting teacher requirements set forth in Group A.

A trip was made to the two cities, Anaconda and Deer Lodge, and interviews were held on the proposed study with school principals, to obtain administrative approval and to arrange for Group B classrooms. Subsequently, the teachers of all classrooms taking part in the study were interviewed.

The teachers were requested to refrain from informing the children of the scheduled writing tasks.

The investigator administered the tasks to all the classrooms for the sake of uniformity. Further it was felt that testing all classes the same day would help reduce to a minimum variations in such influences as Halloween, Thanksgiving, or other holidays which may have a distracting influence on children. For this reason a mutually agreeable date was selected, and all tasks were administered on that date as scheduled.

Group A was composed of 1969-1970 pupils of the following aviation-oriented teachers: in Deer Lodge, Mrs. Wangerin and Mrs. Kemmesat; in Anaconda, Mrs. Olson, Mrs. McKittrick, and Mrs. Stregar. (An error in introducing strong aviation references to Mrs. Stregar's class on the

day of the tasks caused disqualification of her class.)

A list of pupils of both groups may be found in Appendix A.

In order to elicit voluntary, original verbal responses from the children, upon which this study was based, a device designed for this purpose called a "free-writing task" was used. Two free-writing tasks were given to each class in Groups A and B: (1) "What I Want To Be When I Am Grown," and (2) "My Trip to the Sky." Each class was given thirty minutes to complete the two tasks. There were forty-eight fourth grade children in Group A, twelve third grade and seven second grade children. Group B had forty-five in fourth grade, twelve in third grade and seven in second grade.

Analysis of the Data

By reading each paper from both groups carefully, a list of aerospace words and phrases evolved. Words and phrases were interpreted as having aerospace meaning if they referred in context to the act of flight, flight vehicles, phenomena observed in flight, peculiarities of weather affecting flight, persons known to be involved in aviation-related activities, or other words and phrases relating to extraterrestrial activity.

In subjectively evaluating the terms, their use in context was considered, and credence was given to terms in context expressing realistic observations. However, some words were not counted when their use in context was completely unrealistic and showed lack of understanding. For example, a child who wrote of his trip to the moon by rocket ship to pick up moon rocks indicated greater understanding of the concepts involved than did the child who viewed his trip to the moon as beset by green monsters who threw rocks at him. In this example, moon rocks was counted, rocks was not.

The final list of words was verified as having aerospace-related meaning by having two qualified people examine them: one a market research executive for an aircraft manufacturing firm, the other an aviation education specialist. Both are pilots. All thirty-six words on the original list were retained. (See Table 1)

In evaluating the papers for aerospace terms, fourteen different understandings were found that were clearly meaningful to the study, but did not qualify as aerospace terms. A separate list of these verbal responses, or concepts, was made and tabulated in Table 2.

Samples of students' papers are included in Appendix B.

Vocational choices were listed for Group A and Group B, reflecting only the first choices of the pupils in the writing task "What I Want To Be When I Am Grown." Career choices for each group are tabulated by item and frequency. (See Table 3)

Table 1

Comparison of Aerospace Words and Phrases and Frequency of Use

	Words and Phrases	Frequency			Words and Phrases	Frequency	
		Group A	Group B			Group A	Group B
1.	engines	1		19.	land	2	3
2.	cockpit	1		20.	airsick	3	1
3.	747	1		21.	sun	2	3
4.	parachute	1		22.	jet	4	4
5.	capsule	1		23.	rocket	9	5
6.	Little Dipper	1		24.	moon	12	8
7.	Big Dipper	1		25.	airplane	24	30
8.	passengers	1		26.	clouds	10	6
9.	pilot	1		27.	stars	9	3
10.	flying saucers	1		28.	fly	7	5
11.	loudspeaker (intercom)	1		29.	airport	1	3
12.	bumps (turbulence)	1		30.	Mars	1	1
13.	come-in (land)	1		31.	space		3
14.	blast-off	1		32.	put seat back		2
15.	crashed	2		33.	shuttle		1
16.	take-off	2		34.	Apollo		1
17.	moon rocks	1	1	35.	spaceship		2
18.	astronaut	1	1	36.	balloon		2

Group A, N = 67 Group B, N = 64

Frequency of words and phrases:

Group A = 104

Group B = 85

Total = 189

Exclusive words/phrases, Group A	= 16	44.4%
Exclusive words/phrases, Group B	= 6	16.8%
Mutually used words/phrases	= 14	38.8%
	36	100.0%

Table 2

Verbal Responses in Non-Aerospace Terms

Terms	Frequency	
	Group A	Group B
1. Explore the sky	3	
2. In-flight weather	3	
3. Moon walk	2	1
4. Floating sensation	2	1
5. Travel to far places	2	3
6. Way down below	5	4
7. In-flight activity	4	5
8. Way up high over the clouds	5	9
9. Objects on ground look small	5	12
10. Fun in the sky	10	8
11. Life on other planets		1
12. Aircraft as rescue vehicles		1
13. Own a plane (as a car)		1
14. Tanks of air		1

Group A: Number of terms = 10; frequency = 41
Group B: Number of terms = 12; frequency = 49

Exclusive terms, Group A	= 2	14.4%
Exclusive terms, Group B	= 4	28.6%
Mutually used terms	= 8	57.0%
	14	100.0%

Table 3

Students' Vocational Choices

N	Group A	N	Group B
8	Aerospace-related (3) Astronaut (3) Stewardess (1) Pilot (1) Jet mechanic	4	Aerospace-related (4) Astronaut Stewardess Pilot Jet mechanic
14	Teacher	11	Teacher
11	Nurse	9	Nurse
4	Athlete	6	Athlete
4	Farmer-rancher	4	Armed Forces
3	Policeman	3	Policeman
3	Scientist	3	Scientist
3	Armed Forces	3	Logger
3	Clerk (retail)	2	Fireman
11	Items mentioned once	2	Veterinarian
3	No answer	2	Artist
		2	Horsetrainer
		11	Items mentioned once
		2	No answer
67		64	

Chapter 4

INTERPRETATION OF THE DATA

In order to make the subjective interpretation of the data used in this study, the words and phrases used by the children in both Groups A and B were listed by term and by frequency of use of each term. Total frequencies of words and phrases were obtained for both groups, and percentages of exclusive and mutual use of the terms by both groups were computed.

Table 1 reveals that Group A used thirty different words and phrases from the total list of thirty-six, as compared with twenty words and phrases used by Group B. Group A clearly possesses a greater range of words and phrases.

Differences favoring Group A also exist in the number of words and phrases exclusively used by each group. The sixteen exclusive terms used by Group A is 44.4 percent of the total different words used by both groups; the six exclusive terms used by Group B is 16.8 percent. Only 38.8 percent of the total different words were used by both groups.

The same treatment as in Table 1 was given to verbal responses in non-aerospace terms. Information in Table 2 suggests that children in Group B are less able to express themselves in aerospace terms than are children in Group A. Group B children used twelve non-aerospace terms, or 28.6 percent of the total of fourteen items, whereas Group A children used ten, or 14.4 percent. This reinforces the finding that Group A commands a larger aerospace vocabulary than Group B, making less necessary the use of non-aerospace terms to express themselves.

The two groups tended to similarity in non-aviation type vocations, as shown in Table 3, with the top three choices of both groups identical when ranked in order of frequency. However, Group A exhibits a strong preference for aviation-related vocations. Not only did Group A choose aviation-related careers twice as often as Group B, but they also chose four different aviation-related careers as compared with Group B's one.

Chapter 5

SUMMARY AND CONCLUSIONS

The purpose of this study was to determine whether or not effects of aerospace education workshops for teachers show up in their pupils' knowledge and use of aerospace terms, and their vocational choices.

Free-writing tasks were administered to two groups of lower elementary children, Group A having been taught the previous year by an aviation-oriented teacher, and Group B not. The tasks were designed to encourage the children to demonstrate their command of aerospace words and phrases.

Verbal responses in aerospace terms gleaned from the papers of Group A were compared to those of Group B as to relationships between numbers and kinds of terms, and the frequencies of their use. Comparison was also made of responses in non-aerospace terms.

The number and kind of stated career choices were compared for both groups.

Findings of the study were:

1. Group A used a greater range of aerospace words and phrases with apparent understanding than did Group B.
2. Group A used a larger number of aerospace terms exclusively, as compared to the number of terms used exclusively by Group B.
3. The use of non-aerospace terms to express aerospace understandings was greater in Group B than in Group A.
4. Group A stated a larger total number of aerospace-related career choices than did Group B. Of those in both groups choosing aerospace careers, Group A chose a greater variety of jobs.

Based on these findings, the questions posed at the beginning of the study may be answered as follows:

1. Children in classrooms whose teachers have attended an aerospace education workshop (Group A) exhibited knowledge and understanding of terms related to aerospace that is greater than that of children in classrooms whose teachers have not attended such a workshop (Group B).
2. Children in Group A chose aerospace careers more

frequently than did children in Group B.

Even though the results of this study indicated that some effects of aviation orientation of teachers may be present in children's learnings, the evidence was not conclusive that the aviation education workshops were responsible. There are many other factors which could have influenced the results, beyond the control of this limited study, such as these:

1. Some children may have had personal experiences involving flying, or could have been influenced in their interest and attitudes about aviation by other family members.
2. Teachers, though not having attended aviation education workshops, could have had a strong interest and knowledge of aviation that may have affected their pupils.

Recommendations for further investigation of the problem include the following:

1. A larger sample should be obtained, to include classrooms in schools drawn from different geographical areas and different communities, varying in size, economic base, and aviation resources.

2. Upper and intermediate grades should be included.
3. Instruments and techniques designed to measure the amount of behavior change should be used.
4. Provisions should be made to allow for varying teaching methods.

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APPENDIXES

APPENDIX A

Pupils Used in Study

Grade Four

Group A		Group B	
Girls		Girls	
1.	Tammy Berry	1.	Charlene
2.	Nancy McCulloch	2.	Darlene
3.	Renee Jeier	3.	Laurie Lampe
4.	Cindy Bryan	4.	Carolyn V.
5.	Jeanette Ford	5.	Wanda
6.	Debra Lombardi	6.	Mary Lynn
7.	Brenda Hurley	7.	Elizabeth
8.	Michele Slaughter	8.	Mary Ann H.
9.	Cathy	9.	Lee Christine
10.	Marilyn Calhoun	10.	Lyndsay
11.	Laurie	11.	Rose Richter
12.	Sheryl	12.	Roberta
13.	Linda Halquist	13.	Nancy Buterovich
14.	Marilyn Flachmeier	14.	Suzanne
15.	Brenda	15.	Donna Heilskinen
16.	Terri Amith	16.	Valerie
17.	Barbara Wilson	17.	Ranae
18.	Mary McKernan	18.	Kim
19.	Debbie	Boys	
20.	Teresa P.	19.	Frank Reis
21.	Shona Barney	20.	Wayne
22.	Ann Ouldhouse	21.	Paul Rennie
23.	April Straun	22.	Ronnie Knutson
24.	Cindy Hattlestad	23.	Billie Davis
Boys		24.	Dale Fadness
25.	Dick Ehman	25.	Jim Calder
26.	Bob Barot	26.	John Fleming
27.	Pat Menahan	27.	Jack Jones
28.	Bert Chandler	28.	Robin
29.	Todd Rouse	29.	Jack L.
30.	John R.	30.	Jim G.
31.	Jim Shephard	31.	Mike Picket
32	Tommy Hetland	32.	Daniel
33.	Steve Tidwell	33.	Lennie

Grade Four--Cont.

Group A		Group B	
34.	Doug	34.	Warren
35.	Leslie Gervais	35.	Timmy
36	Jack Dresher	36.	Robert Mann
37.	Craig Marcotte	37.	LaMar Nelson
38.	Pat Verland	38.	Tommy Anderson
39.	Blake	39.	Lloyd
40.	Jerry	40.	David Mulke
41.	Dennis	41.	John Luke
42.	Richard	42.	Ricky
43.	Bruce	43.	Steve
44.	Mike Gardner	44.	Dale
45.	Mark	45.	Frank Picket
46.	Timmy		
47.	Tracy		
48.	Bruce Picket		

Grade Three

Girls		Girls	
1.	Jody Beck	1.	Debbie Daniel
2.	Robin James	7.	Tammy Stocks
3.	Patty Paige	Boys	
5.	Mary Alice	2.	Kenny Fike
6.	Debra Spangler	3.	Jimmy Hendricks
7.	Jacki Witwer	4.	John Johnston
9.	Tammy Hansen	5.	Steve Periman
10.	Suzanne Moore	6.	Daniel Stevens
12.	Roxan Sanderson	8.	Paul Baker
Boys		9.	Scott Brand
4.	Scott Ragsdale	10.	Lennie Gervais
8.	Gary Cooper	11.	Larry Melugin
11.	Fred Ring	12.	Gary Ranta

Grade Two

Girls		Girls	
5.	Martha Moore	2.	Suzi Gersitz
Boys		4.	Pennie Stinson
1.	Eddie Ayers	6.	Susan Persons
2.	James LaTray	7.	Laurie Silzly
3.	Gavin Nolte	Boys	
4.	Art R.	1.	Mark Allen
6.	David Bogut	3.	Ricky Kreamer
7.	Timothy Spangler	5.	Robert Daniel

APPENDIX B

Samples of Students' Papers

1. Boy, Second Grade, Group A

My Trip to the Sky

When I went to the sky the clodse looked like puffs of whip cream. The airplane crashed. And some boys came with parashoots and they helped us out.

2. Boy, Second Grade, Group B

My Trip to the Sky

I want on the 747.
And I falt good
I want alon.
I want to the cac pet
I sat bay the wedo
Avre teing was sall.

3. Boy, Fourth Grade, Group A

My trip to the Sky

If I went to the sky I could like to take to wallder-cronkit. and say alewo that would be very fun and then I would like to go to the moon.

4. Girl, Fourth Grade, Group B

I went to the sky in a airplane. And when I look down I saw little houses and little animals but when I was on the ground the houses and animals were very huge. and I ate in the airplane too. And it was fun but I was scared when I was in the sky. So that is the story of my trip to the sky.

5. Girl, Fourth Grade, Group A

My Trip to the Sky

I wish I took a trip to the sky. I would go in a rocket. Also I would be the pilot of the rocket. I would carry about 5 passengers. Then I would make sure that they where buckeled in their seats. And the I would say through the speaker taking off pretty soon, and then blast off. Off I go to the moon.

6. Boy, Fourth Grade, Group B

My Trip to the Sky, May 9 1960

I want to go to the moon to study about rocks and about ways to go to Mars. And I want to no how we bounse on the moon and how are spaceship stayed on the moon. and how long dose it take to get 2,0000 feet in the air.

7. Girl, Fourth Grade, Group A

My Trip To The Sky

I had a airplane trip around the would. It was not a good day to go a the trip. Because that day it was raining. I had a hard time.

8. Boy, Third Grade, Group A

My trip to the sky

I went on the plane and we went way up and the engines CUIT

and we went crashing to the ground.