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A Study of Aviation Education in the Secondary Schools of North Dakota, South Dakota, and Minnesota

Edgar M. Byers Jr.

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A STUDY OF AVIATION EDUCATION IN THE SECONDARY SCHOOLS
OF NORTH DAKOTA, SOUTH DAKOTA, AND MINNESOTA

A Thesis
Submitted to the Graduate Faculty
of the
University of North Dakota

by
Edgar M. Byers, Jr.

In Partial Fulfillment of the Requirements
For the Degree of
Master of Science in Education

February, 1957

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This thesis, submitted by Edgar M. Byers, Jr. in partial fulfillment of the requirements for the Degree of Master of Science in Education at the University of North Dakota, is hereby approved by the Committee of Instruction under whom the work has been done.

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E. M. B.

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CHAPTER I

INTRODUCTION

Great technological and scientific progress has been made in the world in recent years. This technology has given rise to a method of transporting men, products, and ideas through the air at great rates of speed. As a result, aviation has, in a little over fifty years, become a force in the lives of people everywhere. It has influenced events and conditions of life and has changed the living patterns of society. The youth of today will be the adult of tomorrow who will be required to face the problems arising within this society which is affected to such a large extent by aviation.

Thousands of these youths graduate or leave school each year to take their place in industry, private enterprise, or our Armed Forces. New families are formed daily through marriage and new children enter school to progress toward adulthood. The degree of preparedness with which these youths accept their places in society, in so far as knowledge of this air age is concerned, is determined largely by the schools.¹

As America has grown toward maturity, education has

¹Russell N. Cassel, Major, USAF, "Principles for Effective Aviation Education," Education, LXXIV (June, 1954), p. 587.

attempted to keep pace. A society that formerly depended upon an academic offering of the three R's now requires a wealth of technical, scientific, vocational, political, economic and historical data that must be supplied by the nation's school systems. However, technological advances have been so rapid that social and educational developments have not, generally, been able to keep pace. This is especially true in the field of aviation education at the secondary level. Specialized courses on the college and university levels have been inaugurated and the finest aviation programs possible have been implemented by our armed forces, but little effort has been made to furnish fundamental aviation facts to the secondary student of the air age.

Recently a teacher from a mid-western school was overheard to remark, "We've gone through all the ages including the air age, and now, thank goodness, that's over." This delusion about air-age education being "over" is one shared by thousands of other teachers. Actually, it is just beginning to show some signs of effectiveness in the few schools where it is encouraged.² N. L. Engelhardt, Jr., Director, Air-Age Education Research, New York City, and Director of the First Denver Air

²Donald W. Cox, "The Challenge of Air-Age Education in America," The Air University Quarterly Review, VIII (Summer, 1956), p. 109.

Age Congress held in 1945, summarized the problem facing education when he said in his introductory address to the Congress:

Will education as a public institution continue to lag behind technological and social developments, to teach about them after the fact has occurred; or will education as a public institution become a leader, showing, by careful analysis, research, and study, the way in which this new technical tool can be used to improve society? If we are ready to take the lead, if we are ready to push forward the frontiers and to accept the challenges of the very difficult and hard work which such pioneering involves, I think we are on the way to having the greatest society in all history, based on the fullest use of aviation.³

Purpose of the Study

The purpose of this study was (1) to determine the approach to, extent, and types of aviation education in North Dakota, South Dakota, and Minnesota high schools; (2) to determine some of the reasons why high schools do not have aviation education; (3) to determine the views of high school administrators toward aviation education; (4) to determine some of the problems which confront aviation education; (5) and to propose some possible solutions for these problems.

Limitations of the Study

This study was limited to a sampling of high schools in the states of North Dakota, South Dakota, and Minnesota. It was, for the greater part, limited to the present year of 1956-57. However, an effort was made to determine future plans relative

³N. L. Engelhardt, Jr., "The Challenge," First Denver Congress on Air Age Education (The University of Denver Press, 1946), pp. 9-11.

to aviation education in those high schools not presently offering it. This study was further limited to the basic problems confronting aviation education in these states and made no attempt to show the effectiveness of present programs.

Methods Employed in the Study

A preliminary questionnaire of the check list type, a copy of which may be found in Appendix A, was prepared and sent to the administrators of ten selected high schools in each state in order to gain some idea of the frequency with which aviation education was offered and the approach to it. Twenty-eight, or 93 per cent of the administrators returned the preliminary questionnaire and eight, or 27 per cent indicated they offered some type of aviation education in their high school. It was felt that the frequency with which aviation education was offered was sufficient to warrant this study.

A questionnaire, a copy of which is contained in Appendix B, was prepared so that the administrator of the high school could check the correct response or make short statements about the program in his system. A copy of this questionnaire was sent to the administrators of each of forty selected schools in North Dakota, South Dakota, and Minnesota, or a total of 120 schools. The administrators were requested to return this questionnaire to me. One hundred-five, or 87.5 per cent of the administrators returned the questionnaire.

Organization of the Thesis

Chapter II of this study is devoted to a discussion of the

importance of aviation education.

Chapter III is a report of the data received from the replies to the questionnaire.

Chapter IV includes a summary of the data, conclusions based upon the data received, and recommendations.

CHAPTER II

THE HISTORY OF FLIGHT AND THE IMPORTANCE OF AVIATION EDUCATION

The contents of this chapter are divided into four main areas. These are: a brief review of the development of the aircraft; the sociological effect of the air-age; the economic aspects of aviation; and, the need for aviation education in the secondary school.

The Development of the Aircraft

The dramatic story of aviation began with man's earliest desire to fly and conquer the air, to soar on wings through open space. He had longed to fly for centuries, in fact, almost from the beginning of time. This desire to fly is contained in countless stories and legends, a part of many centuries of mythology. One of the most quoted is the legend of Daedalus, the Greek inventor, and his son Icarus written by Ovid at almost the beginning of the Christian era. The legend says that Daedalus and Icarus, to escape from imprisonment, made themselves a pair of wings from feathers and wax. All went well until Icarus flew so high that the sun melted his wings and he dropped into the sea.

The progression from mythology to actuality was not short or simple. In order to achieve this dream of flight, it was necessary for entire arts to be perfected. The science of

mechanical engineering had to be founded, liquid fuels discovered, engines developed and refined, and metallurgy developed to furnish materials for engines and structures.⁴

Some of the principles discovered even before Christ was born have been used in the development of aviation. Hero, a mathematician in Alexandria, Egypt in approximately 100 B. C. discovered the idea of jet propulsion and built a steam jet engine called an aeolipile. Archimedes, a Greek mathematician, discovered the principle of specific gravity in approximately 200 B. C. This principle was later to be used in the launching of balloons and other lighter-than-air craft.⁵ The first person to attempt to solve the problem of flying from a scientific approach was Roger Bacon, the English scientist and writer of the thirteenth century who seriously studied the problem. He used the principle of specific gravity discovered by Archimedes nearly 1,500 years before and suggested the idea of a hollow globe or balloon filled with "liquid fire" which, if launched from a high point, would float. Bacon also suggested a flying machine that would flap its wings like a bird and is now called an "ornithopter". In the late 1400's Leonardo De Vinci, the Italian who was famous as a writer, painter, sculptor, engineer, architect and inventor also gave serious thought to the problem

⁴Archibald Black, The Story of Flying (New York: The McGraw-Hill Book Company, 1943), p. 4.

⁵The World Book Encyclopedia (1955 ed.), I, pp. 574b-c.

of human flight. He built model helicopters and designed para-⁶chutes, rotating wings and aerial propellers.

Man was, for the greater part, limited by what he could see around him and he turned towards the use of wings attached to his arms and legs in an effort to copy the effortless soaring and wheeling of birds in flight. However, his muscle power alone was not strong enough to support his weight for more than the most limited periods, and it certainly could not raise him off the ground. As his mechanical and technical knowledge grew, man invented strange contraptions to overcome his lack of power. Pedals, pulleys, levers, and later on gun-cotton, steam and compressed air were used in an effort to achieve the ability to fly. The history of aviation contains the names of many who attempted to solve the problems of flight and were unsuccessful. Men like Sir George Cayley, John Stringfellow, the Montgolfier brothers, Jean-Marie Le Bris, Alphonse Penaud, Clement Ader, Otto Lilenthal, Percy Pilcher, Octave Chanute, and Samuel P. Langley, while not successful in heavier-than-air flight contributed their ideas and experiences. The transition from legend and story to modern reality was long and difficult, marked by brave experiment, chilling disaster, and finally triumphant success.⁷

This dream became a reality on a memorable day in 1903, when, at Kitty Hawk, North Carolina; Wilbur and Orville Wright,

⁶Black, op. cit., pp. 5-9.

⁷Ibid., pp. 10-52.

Dayton, Ohio, bicycle builders, made the first power-driven flight in history.

The morning of December 17, 1903, was cold and windy with frozen puddles of water remaining from the storm of the previous day. The starting tract (length 60 feet) was laid on level ground and faced the wind. It was Orville's turn to fly and because of the wind, it was necessary for Wilbur to run along steadying the end of one wing until the machine lifted after a run of forty feet. The gustiness of the wind made steady flight impossible and one downward movement when 120 feet from the start, brought the machine to the ground. However, the flight of 12 seconds against a strong wind was equivalent to 540 feet, if made in still air. Thus the first human flight in a power-driven heavier-than-air machine in which the forward velocity was sustained at the same rate to a landing point not lower than the starting altitude was completed.⁸ It is true the plane was flimsy and held together by wire, the homemade engine developed only 16 horsepower for a few seconds before falling off to 12 horsepower, and the distance was not far. Nevertheless, the Wrights proved that man could not only fly, but that flight could be controlled.

The years that followed saw aviation grow from a sport and cow-pasture business for barnstormers and daredevils into one of America's largest industries as man applied the hard-won

⁸Charles D. Chandler and Frank P. Lahm, How Our Army Grew Wings (New York: Ronald Press Company, 1943), pp. 134-35.

knowledge of the air. The rate of progress was not rapid in the early days of aviation. Five years elapsed after Kitty Hawk before Orville and Wilbur were able to reach the altitude of 350 feet. But in the next year Louis Blériot, a Frenchman, flew across the English Channel. The contributions of another former bicycle repairman, Henry Ford, were of great importance to aviation, for it was Ford who began to make improvements in engines which were of great benefit to aircraft designers. Light alloys were made available to the aircraft industry with improvements in metals, and electricity aided in new experiments which were required by a growing aviation industry. The aviation age which dawned at the beginning of a period of general technological research and expansion soon developed its own research and forced the rapid development of all industries related to it.⁹

The growth of this youthful industry was aided by the pressures of World War I when better engines and larger aircraft were developed and aviation began to move from the barnstorming and flying circus days. Passenger flights of relatively long range became possible and practical, improved and more powerful engines, lighter metals, more accurate instrument systems, better landing facilities and more adequate aids for navigation helped speed the progress.¹⁰

⁹Education and 50 Years of Flight (Joint Publication of American Association of School Administrators and National Committee to Observe the 50th Anniversary of Powered Flight), 1953.

¹⁰Ibid.

The military necessity of World War II made aircraft fly higher, faster, and farther than they had ever done before. As a result the aircraft of today can carry loads, cover distances, and fly at altitudes that were only dreams of the early aviation pioneers. It took more than a century to reduce the sailing time between Europe and the New World from 71 days in the age of Columbus to 67 days in the crossing of the Mayflower. Yet, the time between these continents by air has been reduced from the 33½ hours required by Lindberg's flight in 1927 to 4 hours, 45 minutes in 1953 by a B-47 jet bomber flown by Lt. Col. James M. Smith, USAF. Speeds have been increased from the 7 miles per hour by Orville Wright in 1903 to 1,605 miles per hour by Major Charles Yeager, USAF, in 1953;¹¹ United States Air Force B-52 Stratojets have flown non-stop around the world, a distance of 24,325 miles in 45 hours and 19 minutes;¹² aircraft passenger capacity has been increased from one to more than 200; and it is a common sight to see aircraft with a wing span or fuselage longer than the distance of the first flight at Kitty Hawk.

The accelerated development of the aircraft forced new relationships in industry, national life, and international affairs upon man who was slow to adapt to them because his time and space impressions were altered, his world made smaller and he became a neighbor of all peoples. It will not be sufficient

¹¹ Figures from World Almanac, 1955.

¹² News item in the Grand Forks Herald, January 18, 1957.

for man to concentrate on matters as they are today for the end of aviation is nowhere in sight. Wellwood E. Beall, Senior Vice-President of the Boeing Airplane Company presented the views of his company as to developments by 1975 when he said:

At Boeing we can foresee a 200 passenger jet transport with a maximum speed of 1,500 miles per hour at 50,000 feet altitude. This plane will be useful primarily for inter-continental and other non-stop routes. It will fly from Seattle to New York in 1 hour, 45 minutes, and from New York to Paris in 2 hours, 25 minutes.¹³

Similar views were expressed by a group of outstanding aviation experts who, in 1955, were invited by Trans World Airlines to a symposium on the future of aviation. The following predictions were taken from their summaries: aircraft on long flights will fly at 80,000 to 150,000 feet altitudes and at speeds from 1,500 to 10,000 miles per hour with short range aircraft flying at 850 miles per hour. Most of the experts agreed that atomic energy will soon be adapted for propulsion and aircraft will be able to circle the earth many times before refueling becomes necessary. They also predicted the use of air travel by more and more people, the transportation of all mail by air, and that traveling by air to a spot on the other side of the earth for a vacation will be as convenient as a bus ride to a nearby beach.¹⁴

The Sociological Effects of Aviation

History has given evidence that there is no such thing as

¹³Wellwood E. Beall, "What About the Next 40 Years," Boeing Magazine, XXIV (July, 1956), p. 7.

¹⁴"Flight When," Air World Education Study Series, Instructor Unit III (Trans World Airlines, 1956).

a static society. Despite all endeavors to hold the status quo new conditions and new problems arise and new means of dealing with them must be developed. Scientific and technological advances, either accidental or planned, affect and change the lives of all people.

The progress of world civilization has been closely attached to the improvements in the methods of transportation devised by man. As a result, the spread of civilization has for the greater part, followed the major routes of trade. The great cultures of the Egyptians, later the Greeks, and then the Romans were developed around the Mediterranean Sea, an area where water transportation and trade were the most highly developed. Much of the great early literature, music, art, and architecture came from this part of the world. This culture was confined to the Mediterranean area for several centuries because of the lack of suitable transportation.¹⁵

The culture of this day did not reach into Northern Europe until the civilizations of the Egyptians and the Greeks fell into the hands of the aggressive Romans. A series of good stone roads, some of which are still in use today, nearly two thousand years later, were built by the Romans. This network covered much of Europe and extended into the isolated areas of Northern Europe and the British Isles. The Roman roads gave these areas their first contact with the Mediterranean civilization and

¹⁵ John H. Furbay, "Global Minds for an Air World," Education, LXVIII (January, 1948), p. 272.

served as the transportation artery for the spread of the Christian religion and the language, philosophy, and political theories of Rome.

The subsequent improvement of sea transportation and the search for the shortest and speediest "passage to the Indies" led to the famous voyages of Columbus, Vasco da Gama, John Cabot, Ferdinand Magellan, Sir Francis Drake and others. These men and their successes carried the civilization and culture of Europe to many parts of the world, but this influence was still limited by land and water transportation.¹⁶

The development of the American culture and the improvement of the standard of living has also been dependent upon the changes in the systems of transportation within the United States. The period after the American Revolution saw the development of stage routes and inland waterways. Slowly but steadily, the methods of transportation were improved; railroads in the east, stage and pony express in the west and finally on May 10th, 1869, when Leland Stanford drove the famous golden spike, the East and West were joined by a narrow ribbon of steel track and the country truly became the United States. The period following World War I was marked by the sensational rise of the automobile. As a result, cheaper transportation of products, suburban living, and the chance to meet and associate with people from a larger geographic area and the resulting exchange

¹⁶William E. Givens, "Air Lanes and Education," Education, LXIV (June, 1944), p. 590.

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of ideas were made possible.

The character of life that man has led has been changed by each large improvement in transportation and methods of supply of the goods of the world. Yet, no means of transportation has been created which has had such a tremendous impact, both actual and potential, upon the entire civilization of the world as the aircraft. Aviation has become a gigantic force and one which has a direct or indirect effect upon all the peoples of the world.

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Since water was the major form of transportation, ancient cities were founded around good harbors and along rivers and seacoasts. The coming of the railroad and then the automobile caused new cities and towns to grow inland. Still other cities have grown along air routes because of the importance of air transportation. Karachi, the capitol of Pakistan, is an example of such a city. Prior to World War II, Karachi had been a small unimportant seaport. Many military aircraft were routed through Karachi because of the war and this city developed into one of the world's leading air terminals and important centers. Gander in Newfoundland, Shannon in Ireland, and Reykjavik in Iceland are other examples of cities that have become important because they are located on major flying routes. The importance of many

¹⁷Terrell C. Drinkwater, "Flying Into A New World," First Denver Congress on Air Age Education (The University of Denver Press, 1946), pp. 102-3.

¹⁸Givens, op. cit., p. 591.

small islands such as Guam, Wake, and Midway in the Pacific and the Azores in the Atlantic can be traced to their geographic lo-
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cation on the world air routes. Aviation has also helped to unite countries with a large geographical area such as Australia, Canada, and China. One of the authorities writes that Chiang Kai-Shek believes it would have been impossible to have unified
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China without the aircraft.

The development of aviation has forced upon the world a situation of close human relationships by bringing the world centers closer together. Because of aviation the people of America can never again be remote from those of other countries. Indeed, the world has for practical purposes, shrunk in size because the aircraft has enormously decreased the time it takes to get from place to place. Americans are living within hours of any location on earth and must recognize that they are, in fact, the neighbor of every man.

Now that the people of this country are living side by side with those who were once far removed, their lives, including customs, beliefs, government, and mores are exposed and within the view of the entire world. The world of the old time isolationist no longer exists, and as a result, social frontiers must be erected on the basis of good will and self respect; to do this

¹⁹The World Book Encyclopedia, op. cit., p. 571a.

²⁰John H. Furbay, "Aviation - World Outlook Today," Education, LXVI (September, 1955), p. 6.

it will be necessary to work out all possible means of getting along with others. This is one of the greatest problems facing education. Although the children in the schools today will be taking their places in a world which is far different from that in which their grandfathers lived, the majority of adults do not consider it to be so different for they are indifferent and resistant to change. They refuse to recognize that they are living in the air age.

The earth today is no different from the earth on which people lived centuries ago. The mountains, the oceans, the deserts, the polar regions, and the air oceans have not changed, but their importance and influence upon the life of man has been drastically altered by the aircraft. Man had struggled for centuries to find a passage through the north and almost overnight the polar regions were opened and became accessible by means of air transportation. Brave seamen fought the seas for five hundred years to develop a transportation contact between the old and new worlds. Yet, Charles Lindberg flew the Atlantic Ocean only 24 years after the historic flight of the Wright Brothers. The Himalayas have acted as a barrier between the civilizations of China and India since the beginning of time. However, even this majestic barrier has been eliminated, as aircraft fly across the tops of the ranges at three and four hundred miles per hour. This was proven in World War II when more supplies were flown into China in one day than could be transported over-

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land in one year.

It appears that the final chapter in making the world smaller is being written by the aircraft. The progression has been marked by horses, wheeled vehicles, paved roads, railroads, and motor vehicles on land, and rafts, canoes, oared vessels, sailing ships, and ships propelled by steam, oil or engines on the water. Man was able to travel only ten or fifteen miles in an ordinary day for a million or so years. The use of horses or camels doubled this speed to thirty or more miles and this was the normal speed for a period of 10,000 years until stage coaches, traveling by night as well as day, led to an increase up to a speed of 150 miles in a day. The locomotive, with a smooth roadbed and metal tracks, provided an increase up to 1,200 miles per day within the brief span of a century. Now aircraft have brought a still greater increase. With speeds of 500 and 600 miles per hour common, it is now possible to travel 15,000 miles in a twenty-four hour period.

This progression of intense changes meant that the size of the world, as measured in terms of a day's travel, had shrunk so much that the travel time from Portland, Maine to San Diego, California decreased from two years on foot before the white

²¹N. L. Engelhardt, Jr., "Education For This Age," Education, LXVIII (January, 1948), p. 261.

²²Ellsworth Huntington, "Geography and Aviation," Geography in the Twentieth Century, ed. by Griffith Taylor, (New York: Philosophical Library, 1951), pp. 528-29.

man reached America, to eight months on horseback in the 1600's, to four months by stage coach or wagon in 1840, to four days by rail in 1910, to approximately seven hours by aircraft in 1957.²³ Furbay describes the smallness of the world from personal experience when he writes:

I wouldn't have believed how small the world has become but for an experience I had last year going over to Europe. We had breakfast in New York, lunch over the Atlantic, and dinner in Ireland. Then, after I got off the plane I played nine holes of golf before it was dark; and this was all in one day.²⁴

A comparison between the time of travel from Washington, D. C. and Damascus, Syria by aircraft and boat will serve to further illustrate how the aircraft has made the world seem smaller. A great circle route from Washington, D. C. to the destination passes over St. Johns, Newfoundland and Paris, France. The distance is 6,000 miles and for the commercial aircraft traveling at 400 miles per hour, would require fifteen hours of flying time. The trip by ship would have to be somewhat south of the great circle route since it would be necessary to go through the Strait of Gibraltar and then on to Damascus.²⁵ A fast ship would require about 2½ weeks to make the trip.

There are many ways in which this increase in speed will influence war, politics, trade, and travel. Huntington, in 1947, wrote:

²³Ibid., p. 529.

²⁴John H. Furbay, "Educational Implications of the Air Age," Chicago Schools Journal, XXXII (September-October, 1950), p. 3.

²⁵The World Book Encyclopedia, op. cit., p. 571.

Almost every intelligent person knows that if war continues to be one of our customs, no part of the world is safe if atom bombs can be dropped by planes that can fly non-stop across continents....The ease with which officials of the most remote countries can confer with one another face to face at short notice may in the long run do more than the fear of bombers to prevent war. The growing acquaintanceship and trade of the nations as a whole may be still more important. People who have travelled much, or have seen many foreigners in their own homes, are generally far more friendly to other countries and less suspicious of them than are those who always stay at home and see few strangers. Five or ten years from now, when peace and reasonable comfort return to war-weary Europe and Asia, international travel will doubtless increase greatly because aviation will make it so easy. Business men will hop back and forth to Europe, Asia, and South America as readily as they now move about the home. Trade will once more increase and in due time will be far greater than ever before.²⁶

Although Huntington wrote those things in 1947 they have become a reality. Man can now go any place the air goes and the air goes everywhere. He is no longer limited by restrictions of the earth.

The impact of aviation has changed American relationships with the rest of peoples of the world and has opened up possibilities for social study never before possible. In view of this importance, it has made necessary the development of social skills and understandings newly required of students. Since the students of today are going to associate more with peoples of distant lands and are going to be effected by happenings in "far away lands", they must have a concept of world citizenship.

The nations of the world have, as a result of aviation, made great strides in the development of the economic and social aspects of their civilizations. This rapid progress does not

²⁶Huntington, op. cit., p. 529.

happen in all segments of society at the same rate or at the same time. As a result these imbalances in society present themselves as social problems. ^{effects} Today's students need to acquire an understanding of some of the present social problems that have been created by the aviation age and of possible future problems that may emerge in the wake of new advances in aviation. It is important that they are aware that these changes happen slowly but that such technological forces as aviation have speeded up the process. Tomorrow's adults must also understand that they are living in an interdependent world, that is, a world in which the problems of all nations have a direct and immediate effect upon our own way of life. ²⁷ Outstanding examples of this interdependence and the use of the aircraft to bridge political and economic as well as geographic barriers have been the mercy flights of the United States Air Force. Operation Safe Haven, the recent airlift of 9,700 Hungarian refugees who were fleeing the scourge of the Red wrath, is one of many mercy errands assumed by the United States Air Force. The Berlin Airlift during 1948 and 1949 was an almost incredible accomplishment which heralded the approaching maturity of aviation. During this one year and one month period, a city of 4½

²⁷ H. E. Mehrens (ed.), Aviation in School and Community (published by American Council on Education in cooperation with Civil Aeronautics Administration, Washington: Judd and Detweiler, Inc., 1954), p. 10.

million people lived completely cut off from the world by any form of surface transportation. Everything necessary for their subsistence, food, clothing, fuel, and other items, was supplied by aircraft. There are other similar exploits by the United States Air Force that are worthy of note: the Mecca airlift of 1952 when 4,000 Moslems were transported to the spiritual center of Mecca; the Pakistan Medicine lift in 1955, a war against pestilence in Pakistan; and Operation Snowbound 1956, when America's Air Force went to the rescue of Italians hit by Europe's worst winter. The Mufti of Lebanon, Mohammed Alaya, put the appreciation which the Arabs felt for the Mecca airlift in words:

Speaking for myself and forty million Arab Moslems, I would like to say that this is the turning point of American relations with the Moslem world. This aid has not been to governments but to people. It is neither military nor economic but spiritual.²⁸

Recent events have proven that such feelings have been forgotten by the Moslem world at large. But 4,000 Moslems, at least, will not forget that American assistance made possible the accomplishment of one of the great goals of their lives.

Education must meet the challenge and teach the importance of the influence of aviation on the economic, political and social way of life. This can be done through integration within the various areas of the curriculum, or special units, or basic

²⁸The Military Instrument of National Security (Air Science I, Vol. V. Montgomery: Air Force Officer's Training Corps, 1953), p. 79.

aviation courses, whichever is appropriate to the particular school system. Aviation education should be broad in scope and should concern itself primarily with how and in what ways it has changed the living habits of the world today. One of the problems facing aviation education is the fact that too many of the textbooks and too much of the supplementary materials are related to the world of yesterday and too little to the present and the future.²⁹

Teachers today should not be expected to teach the potentialities of the air age with materials that were prepared by those who were unfamiliar with this method of transportation with its high speeds.

Mental ideas of the world are for the greater part, based upon a map devised in 1569 by a Flemish geographer whose Latinized name was "Mercator." This projection was a fine map when first presented and is still valuable for some purposes, but not for the teaching of international relationships.³⁰ Although students were taught that the world was round, the map on the printed pages or in the front of the classroom said it was flat. If a person were to ask most people even the most simple questions about navigation, he would get a flat-earth answer in nearly every case. In answer to the nearest route from Kansas City to Europe, they would all probably say to go to New York

²⁹Jordon L. Larson, Colonel, USAFR, "Aviation and the School Administrator," Education, LXXXVI (September, 1955), p.30.

³⁰J. Parker Van Zant, The Geography of World Air Transport, (Washington: The Brookings Institution, 1944), p. 1.

then east across the Atlantic to Europe. This route traveled by surface transportation is not the shortest in the day of the aircraft. The aircraft would leave Kansas City in a northeast direction, departing the United States at Chicago or Detroit. In fact, it would not pass near New York, or even Maine. If a traveler were flying from Kansas City to China, he would not go to California and then Hawaii, but would leave by Chicago or Minneapolis and proceed north by northeast, through Alaska.

North has become the important direction in the day of the aircraft. The northern hemisphere contains the major populations, technical skills, financial strengths, and natural resources of the world. Ninety-four per cent of all the people on the earth and 98 per cent of all the industrial activity are situated in this half-sphere.³¹ The shortest routes between the United States and other areas of this hemisphere lie to the north by air. It is north from the United States to Europe, the Middle East, and Asia and north from these areas back to the United States.

There is another factor relative to these new air routes that must be given consideration. Just as the commerce and travel of the world are moving toward the north it is certain that if this nation is attacked by an aggressor it will come by air and from the top of the world. Military leaders no longer

³¹ Ibid., p. 4.

expect an attack by surface vessels from across the Atlantic or Pacific Oceans, but are concerned about the northern routes. There is no target in this nation that can not be reached within two hours after enemy bombers have crossed the borders of this country. The heart of the United States is just a few hours from the homeland of any possible aggressor.

The United States must be prepared to meet these attacks when and if they come. For this reason large sums of money are being spent to build air bases, navigation aids, and early warning radar stations within the Arctic Circle. It is imperative that an integrated system of communications to warn of the approach of the enemy, and air bases from which to intercept him before he reaches our shores be established. The evolution of the aircraft, with its trans-oceanic and supersonic speeds and intercontinental range, together with the development of atomic and thermonuclear bombs, have made it necessary for the nations of the world to revise completely their military and political objectives. The airborne weapons of today and those in the foreseeable future are able to cripple and even destroy the military and economic capabilities of any nation in a matter of days, or perhaps even hours. These are vital problems that the students of today will have to face when they take their places in the adult world. Educational practices must recognize the significant implications that aviation holds for society.

In defining education, Bossing wrote:

The function of education is conceived to be the adjustment of man to his environment, which contemplates

man's adaption to and the reconstruction of his environment to the end that the most enduring satisfaction may accrue to the individual and to society.³²

Education should lead to the development of democratic thinking and planning because a group of people are needed who are equipped with the skills, attitudes, and knowledge to help the country move forward in this ever changing world. The role America, as a democratic state, will assume in the world will depend, in part, upon the continued progress of her aviation program. This continued progress will, in turn, depend upon an informed and interested body of citizens.

One writer has indicated this responsibility in the following manner:

The man on the street - the voter - determines what air power we will have. If the voter is a well-informed, air-minded citizen, our air power will be adequate The schools have a definite responsibility for citizenship training in regard to understanding the airplane and all of its ramifications.

Strickler continues with a more definite statement on the responsibility of the school, stressing:

Programs of aviation education suitable to the interests and needs of all levels of education must be continued where already in existence and started where they are not being carried on at present.³³

The Economic Aspects of Aviation

Aviation has, in a little over fifty years, become a major

³²Nelson L. Bossing, Principles of Secondary Education (second edition; Englewood Cliffs: Prentice-Hall, Inc., 1955), p. 193.

³³Mervin K. Strickler, Jr., "The Importance of Aviation Education in the Elementary and Secondary Schools," Education, LXXIV (June, 1954), p. 606.

industry carrying passengers, freight, mail, and express over the world. The implications of flying upon commerce have been great. It is now possible to move men and goods long distances in short periods of time. As a result, many fragile and perishable items can be shipped to faraway countries since the distances from factory to store are, in effect, reduced. New marketing areas in isolated communities, inaccessible by other means of transportation, have been opened by the aircraft.

The businessman has been able to revise his methods of operation since the advent of the aircraft. He has been able to handle perishable items, keep abreast of current styles, and utilize sources of materials that were inaccessible before the age of aviation. He has also been able to reorganize the manner in which he has handled his business with a resulting saving of time. By the use of regularly scheduled airlines the businessman can fly quickly to distant cities and countries. He can complete his business and return to his home office in a matter of hours or days at the most. Before aviation such trips would have taken weeks or months, if undertaken at all.

Aviation has become an integral part of the economy of the United States through its position as one of the leading manufacturers, ranking second to the automotive industry. The idea that aviation is the second largest industry in America is startling to some outsiders. It does not seem possible that it is larger than shipbuilding, railroading, or the building industry.

The complexity of the aircraft used today has caused the aviation industry to grow to the point where hundreds of factories and thousands of workers are necessary for the production of a single aircraft.

The commercial airlines of this country were established under regulated competition by the Civil Aeronautics Act of 1938. Since that time they have made large contributions to the commerce and economy of the country. The number of certified airlines has risen from 22 to 56 and the number of employees has increased from 13,300 to more than 118,000. The domestic and international scheduled airlines have increased the passenger miles flown 4,489 per cent, from 533,052,000 miles in 1938 to 24,463,158,000 in 1955. The number of daily scheduled airline flights has increased from 284 in 1938 to over seven times that number in 1955. An indication of the value that the public has placed on modern air transportation is that it has increased its spending for all kinds of airline travel at a greater average yearly rate than it has for any other type of personal spending. The revenue passenger-miles increased from 20,605,058,000 in 1954 to 24,338,000,000 in 1955, a gain of 18.1 per cent. Air transportation alone was responsible for about a 3 per cent increase in domestic inter-city passenger traffic in 1955 and now carries 32.86 per cent of this traffic as contrasted with only 8.67 per cent in 1947. In order to be able to meet continued demands the industry placed positive orders and made public

statements of intentions for equipment-buying plans totaling
³⁴
 \$1,309,600,000 in the coming year.

Mr. Sinclair Weeks, Secretary of Commerce, and the cabinet member most concerned with the business activities of the nation, set forth the importance of aviation when he recently told a group of state aviation officials:

The total American investment through 1955 in the aviation industry - military and civil - is something in excess of 100 billion dollars, which figure we conservatively estimate will be 150 billion by 1960.

Mr. Weeks did not provide any breakdown of his figures during the talk, but he was undoubtedly referring to such items as Governmental and aircraft industry investments in manufacturing facilities, tooling and testing equipment, aircraft and many other factors. On the other hand, he was probably not including in his 100 billion figure several billion additional dollars injected into the national economy as the result of aviation. This amount would come from the salaries and wages of the more than 800,000 employees of the basic aircraft industry, the 250,000 persons earning their livelihood working for the 60,000 subcontractors to the basic industry, the 100,000 persons working for the airlines, the 960,000 personnel in the Air Force, and the additional scores of thousands assigned to the Army,
³⁵
 Navy and the Coast Guard aviation.

³⁴Figures from Air Transport Facts and Figures (Washington: Air Transport Association of America, 17 ed., 1956).

³⁵"Air Review," VII (November 9, 1956) (published by National Security Council of the American Legion).

The financial structure of the aviation industry and its effect on the national and world economic structure have implications for all students. It is the responsibility of the school to see that they understand the significance of the economic changes brought about by aviation.

Aviation Education in the Secondary School

Define What is aviation education? Is it a new "subject", one that is to be taught in the same manner year after year? It is defined by the American Association of School Administrators and the National Committee to Observe the 50th Anniversary of Powered Flight as: "a method of teaching for positive attitudes to aviation through providing experiences which will help children to understand how flight is affecting their lives, how they can live fuller lives through accepting the help of aviation, and how they themselves can find their place in the second greatest industry in their country, if such is their inclination."³⁶

Aviation education, until recently, was defined generally in terms of aeronautical skills. The most common objectives were pre-flight aeronautics courses in general education and aircraft mechanic courses in vocational education. During the years of World War II, thousands of students were offered courses such as aircraft welding, electronics, instrument installation and repair, and hydraulics, as well as the usual aircraft and engine mechanic courses. These courses were offered to students

³⁶Education and 50 Years of Flight, loc. cit.

of all ages in high schools, vocational schools, in technical institutions, and in evening classes. Thousands and thousands of war production workers were trained, and the rapid growth of the aviation industry and our World War II aviation forces were made possible by this training. This need no longer exists today, and the problem of aviation education is now concerned with the preparation of the individual student so that he may cope successfully with the circumstances of the aviation age. Engelhardt defines aviation education in this manner:

Education for the air age is obviously not a new subject nor vocation. It is all of education directed toward the accomplishment of this challenge: the creation of a good life in a society which is to be dominated largely by the use of air.³⁷

Aviation education, then, is general education as it concerns aviation and should be distinguished from technical or special education. It should cover all the attitudes, understandings, and knowledge that the informed air-age citizen of this day should have.

With the influence of aviation on the modern world becoming more intensive each day, it is important that the schools revise their curriculums and make a place for aviation education materials and concepts. Professional schools, trade schools, and technical and vocational high schools, have been aware of the opportunities for young people in aviation for several years

³⁷N. L. Engelhardt, Jr., "Education for the Air Age," Education, LXVI (June, 1944), p. 586.

and have been offering beginning and exploratory courses in aeronautics and related fields. The present problem facing education is not one of occupational training but one of presenting general aviation education and its concepts within the program of the secondary school. This can best be accomplished by presenting aviation education by means of integration with those subjects now offered in the secondary school. In this manner, it can contribute to the attainment of the more general objectives of the school.

General James H. Doolittle, speaking before a Wright Memorial Dinner which climaxed the 50th Anniversary of Powered Flight, in 1953, told 151 classroom teachers who were being honored for their work in aviation education:

What you have done in developing among your students a greater interest in aviation is a public service of the highest order . . . I hope the anniversary year may prove to be active or a stimulus to interest more people in aviation education - but even more, now that the Jubilee is over, I hope that the educational program will be carried on and enlarged.

Stressing the importance of aviation to our economy and security, General Doolittle declared, "The future of freedom in this country and peace on earth will be determined in large part by our progress in aviation."³⁸

If education recognizes that youth should become acquainted with the problems of an aviation age then vigorous educational

³⁸ Elaine Exton, "The Growing Importance of Aviation Education," The American School Board Journal, CXXVIII (May, 1954), p. 62.

leadership will be required to obtain the objectives. One of the most difficult problems to overcome in the educational system is the lag between new ideas and advances and their incorporation in our educational program.

It is seldom that education has had the opportunity to actually aid in the planning of an important sociological movement. The automobile, radio, and motion pictures were all developed and perfected before their educational possibilities were realized and utilized by the school. Research has indicated that fifty years must elapse before a new idea in education gains acceptance. Mort states that:

It takes an amazingly long time for a practice to spread through a state or nation as a whole. Fifty years from the time of the first introduction to complete diffusion is a conservative estimate. Diffusion is extremely slow during the initial or introductory period; it speeds up rapidly after about fifteen years have passed and then slows down again after 70 per cent to 90 per cent maturity.³⁹

If fifty years must pass before education accepts the problems of the aviation age, aggravated by the results of nuclear advances, human society may no longer be present on the earth.

The lapse of time in the acceptance of new changes by education is a result of traditional teaching procedures and delay in bringing textbooks up to date. The usual way of introducing needed changes in education has been by means of conferences and articles in professional journals. Because of the importance of

³⁹Paul R. Mort, "Educational Adaptability," The School Executive, LXXI (September, 1951), p. 41.

bringing aviation into the offering of the schools at the earliest possible moment, an attempt must be made to reduce this fifty year lag period as much as possible. That might be accomplished in the following manner according to one authority: (1) aviation workshops, which have made considerable progress in the last few years should be continued and expanded; (2) the schools should cooperate to the fullest extent possible with other agencies interested in aviation education. Some of these are: the National Aviation Education Council; the Civil Air Patrol; the National Aeronautics Association; the Aircraft Industries Association; the United States Air Force; the United States Office of Education; the American Council on Education; and the American Association of School Administrators.⁴⁰

One of the special problems is that of teacher preparation. The majority of teacher training institutions do not offer aviation education material in their courses. Until this type of material is incorporated by these institutions it will be necessary for each secondary school to organize and conduct a thorough in-service program for training their teachers in air-age concepts. The importance of this type of training has been identified in a report of a committee of the American Association of School Administrators:

The success of air education rests heavily upon what is done to help the classroom teacher in-service. Such in-service preparation and help can be given through teacher-training institutions, lectures, visits to aviation

⁴⁰Larson, op. cit., p. 31.

installations, and many other ways. Teachers should be released from classroom duties to participate in such activities.

The report further suggests:

Also whenever possible, firsthand flying experience should be provided for those enrolled in in-service aviation projects Keeping abreast of air-age developments and disseminating significant information to classroom teachers are responsibilities of superintendents and their staffs.⁴¹

Many educators agree that the importance of aviation in contemporary life calls for its inclusion in the school program. Brown maintains that: "More than ever, the impact of aviation in our society warrants special consideration by the schools."⁴²

The American Council on Education expresses the importance of aviation education this way:

A well-established educational principle states that interest is essential to learning. The fact that the airplane is a familiar aspect of the environment of contemporary youth does not lessen his curiosity toward and interest in the aircraft . . . and the part it plays in the drama of his day. Rather, it enhances this interest.⁴³

Since the aircraft is a common sight in the world of our youth it is a factor to be considered as an incentive for learning and enriching the school's program of both instructional and co-curricular activities. Dr. Evan Evans, Executive Director of the National Aviation Education Council, stated before a discussion group of the American Association of School Administra-

⁴¹Aviation Education (A Report of a Committee of the American Association of School Administrators, 1949), p. 8.

⁴²Willis C. Brown, "Fifty Years of Flight," School Life, XXXV (March, 1953), p. 94.

⁴³Exton, loc. cit.

tors' 1954 Convention:

I believe that the utilization of aviation materials, aviation information, aviation techniques, and aviation personnel in the fundamental teachings of the school make children learn more, and more quickly

In the schools where experimental work has been done they have found this a two-way program, first the utilization of those ideas and materials consistently in the normal development of a good curriculum, second on some grade levels teachers have set up an aviation unit where they have focused all of the teaching of the school for a few days or a few weeks on these aviation materials.⁴⁴

The evaluation of aviation education by teachers who have used it adds emphases to these views. A committee on Aviation Education appointed by the American Council on Education, in 1951, published the results of a study on successful curriculum practices in aviation. Some of the comments by teachers were:

Perhaps in general, aviation education's best contributions were to vitalize those subjects which sometimes appear dull and uninteresting.

Aviation exemplifies a practical place where science and mathematics are important.

It emphasizes a real need for understanding and speaking a modern foreign language.

It gives purpose to the social studies . . . served to strengthen the child's knowledge of geography.⁴⁵

A report on aviation education prepared by the American Association of School Administrators emphasizes the importance of aviation education. The report states:

⁴⁴Ibid.

⁴⁵H. E. Mehrens (ed.), Adventures in Aviation Education (Washington: George Banta Publishing Company, 1951), pp. 18-19.

The airplane is a symbol of the changes and trends of contemporary life. In common with every other significant technological advance, the airplane emphasized the need for better teaching of safety behavior and attitudes; for better teaching of democratic values and world understanding

The report then continues in reference to the value of aviation to the future:

The airplane is also a symbol of the dangers implicit in every technological advance: a machine can be used for both good and evil. Therefore, youth should be educated not only to appreciate the airplane's power for good, but to maintain intellectual and emotional balance in an ever-changing world situation. No better medium is provided for teaching this need for adaptation than aviation. If adjustment of our youth to these changes is achieved, the future is bright with opportunity.⁴⁶

Aviation education is only one factor in the entire educational program. Therefore, its problems are those common to all education. The influence of aviation is of such importance because aviation has become a major factor in national power and perhaps in the survival of all civilization. However, just as important is its effect upon all peaceful pursuits in the world. This aspect of aviation is as powerful or more powerful than any other social force of this age. Aviation's total impact imposes many responsibilities upon education. Interest and action in aviation education by secondary schools is essential.

The following chapter will present an analysis of the aviation education practices in secondary schools of North Dakota, South Dakota and Minnesota. The material for the analysis was taken from the questionnaires completed by high school administrators.

⁴⁶Aviation Education, op. cit., p. 2.

CHAPTER III

ANALYSIS OF QUESTIONNAIRE RETURNS IN RELATION TO AVIATION EDUCATION IN THE SECONDARY SCHOOLS OF NORTH DAKOTA, SOUTH DAKOTA, AND MINNESOTA

Questionnaires were sent to the secondary school administrators of each of forty selected schools in North Dakota, South Dakota, and Minnesota, or a total of 120 schools. Administrators from one hundred-five, or 87.5 per cent returned completed questionnaires with a total of forty-nine, or 46.6 per cent indicating that some type of aviation education was offered in their school system. This information is contained in Table I. The material on the following pages of this chapter is based upon an analysis of the information contained in the completed questionnaires and is presented in the order of appearance of the items in the questionnaire. A brief comment precedes each table calling attention to some of the outstanding results of the compilations.

TABLE I
NUMBER OF SCHOOLS REPLYING TO QUESTIONNAIRE

Questionnaires	Number of Schools			Total
	North Dakota	South Dakota	Minnesota	
Number Sent	40	40	40	120
Number Returned	36	33	36	105
Number Not Returned	4	7	4	15

Practices in Aviation Education

Table II shows the number of secondary schools in each of the states that offer aviation education and the number that do not have such a program. No attempt is made in this table to indicate the number of schools offering aviation education as a basic course or integrating it with other courses. This information is contained in Table III, page 40. Minnesota led in the total offering of aviation education with twenty of the schools reporting its use. South Dakota had the lowest number offering the program, with twelve of the administrators reporting the use of some form of aviation education.

TABLE II

NUMBER OF SECONDARY SCHOOLS OF NORTH DAKOTA, SOUTH
DAKOTA AND MINNESOTA OFFERING AVIATION EDUCATION

	Number of Schools		
	North Dakota	South Dakota	Minnesota
Schools offering aviation education	17	12	20
Schools not offering aviation education	19	21	16
Total	36	33	36

The administrators from those schools offering aviation education were asked whether it was offered as a basic course in itself, or whether it was integrated with other courses. Table III indicates that the greatest number of administrators,

79.6 per cent, reported that aviation education was integrated with other courses, and 20.4 per cent, reported that it was offered as a basic course. Twenty-five per cent of the secondary schools of South Dakota and Minnesota offered basic courses while only 11.5 per cent of these in North Dakota did so.

TABLE III

PERCENTAGES DENOTING THE MANNER IN WHICH AVIATION EDUCATION IS OFFERED IN SECONDARY SCHOOLS OF NORTH DAKOTA, SOUTH DAKOTA, AND MINNESOTA

Practice	Percentage of Use			
	North Dakota	South Dakota	Minnesota	Total
Schools offering basic aviation courses	11.5	25.0	25.0	20.4
Schools integrating aviation	88.5	75.0	75.0	79.6
Total	100	100	100	100

The data with regard to the extent of integration with other courses in the schools reporting this type of program are presented in Table IV. The subject of general science led in the integration with 100 per cent of the administrators reporting the use of aviation materials to supplement this subject. The next most frequent subject integrated with aviation materials was physics, reported by 87.1 per cent of the administrators. Other courses with a high total frequency of integration are: mathematics, 48.7 per cent; geography, 43.4 per cent; and civics or problems of democracy, 40.8 per cent. Table IV also reveals

a very low use of aviation materials with art, journalism, and foreign languages, with 7.1 per cent for art and journalism, and 5.1 per cent for the foreign languages. Commercial subjects, 11.2 per cent, agriculture, 14.8 per cent, and biology, 20.4 per cent were other subjects with a low frequency of integration. The administrators indicated that the majority of the subjects listed were integrated a little or very little with aviation materials. They also reported that physics, 25.6 per cent, general science, 17.8 per cent, and economics, international relations, and industrial arts, 2.5 per cent each, were integrated very much, or much of the time.

TABLE IV

PERCENTAGES OF INTEGRATION OF AVIATION EDUCATION
WITH OTHER COURSES IN THE SECONDARY SCHOOLS OF
NORTH DAKOTA, SOUTH DAKOTA AND MINNESOTA

Course	Percentage of Integration					Total
	Very Much	Much	Little	Very Little	Not At All	
English and Language Arts	0.0	0.0	5.1	15.3	79.6	100
History	0.0	0.0	28.2	10.2	61.6	100
Economics	0.0	2.5	23.1	12.8	61.6	100
Geography	0.0	0.0	35.9	7.5	56.6	100
Civics or Problems of Democracy	0.0	0.0	33.3	7.5	59.2	100
International Relations	0.0	2.5	10.2	12.8	74.5	100
Mathematics	0.0	0.0	35.9	12.8	51.3	100
Biology	0.0	0.0	2.5	17.9	79.6	100
Physics	0.0	25.6	48.7	12.8	12.9	100
General Science	2.5	15.3	51.4	30.8	0.0	100
Chemistry	0.0	0.0	12.8	17.9	69.3	100
Commercial Subjects	0.0	0.0	10.2	1.0	88.8	100
Industrial Arts	2.5	0.0	17.9	12.8	66.8	100
Art	0.0	0.0	2.5	4.6	92.9	100
Mechanical Drawing	0.0	0.0	7.5	12.8	79.7	100
Foreign Languages	0.0	0.0	0.0	5.1	94.9	100
Agriculture	0.0	0.0	4.6	10.2	85.2	100
Vocational Guidance	0.0	0.0	20.2	10.2	69.6	100
Journalism	0.0	0.0	2.5	4.6	92.9	100
Others	0.0	0.0	0.0	5.1	94.9	100

The reports of the administrators of the secondary schools in North Dakota integrating aviation education with other courses show that general science was integrated in all schools. Physics followed with 73.5 per cent of the schools supplementing it with aviation materials. Other subjects extensively integrated were civics, or problems of democracy, 66.7 per cent; geography, 66.6 per cent; economics, 53.4 per cent; and mathematics, 53.3 per cent. Those courses with a low percentage of integration were foreign languages which were not integrated at all; art and journalism, 13.3 per cent; and biology, 13.4 per cent. General science, and physics, 33.4 per cent; and economics and international relations, 6.7 per cent were reported as being supplemented by aviation education materials much of the time. The courses reported as not being integrated and the percentages of administrators reporting foreign languages, 100 per cent; art and journalism, 86.7 per cent; biology, 86.6 per cent; and chemistry and industrial arts, 80.0 per cent. Table V shows the extent of integration in North Dakota.

TABLE V
 PERCENTAGES OF INTEGRATION OF AVIATION EDUCATION
 WITH OTHER COURSES IN THE SECONDARY SCHOOLS OF
 THE STATE OF NORTH DAKOTA

Course	Percentage of Integration					Total
	Very Much	Much	Little	Very Little	Not At All	
English and Language Arts	0.0	0.0	6.7	20.0	73.3	100
History	0.0	0.0	33.4	6.7	59.9	100
Economics	0.0	6.7	33.4	13.3	46.6	100
Geography	0.0	0.0	53.3	13.3	33.4	100
Civics or Problems of Democracy	0.0	0.0	53.4	13.3	33.3	100
International Relations	0.0	6.7	20.0	13.3	60.0	100
Mathematics	0.0	0.0	40.0	13.3	46.7	100
Biology	0.0	0.0	6.7	6.7	86.6	100
Physics	0.0	33.4	33.4	6.7	26.5	100
General Science	0.0	33.4	53.3	13.3	0.0	100
Chemistry	0.0	0.0	6.7	13.3	80.0	100
Commercial Subjects	0.0	0.0	13.3	13.3	73.4	100
Industrial Arts	0.0	0.0	13.3	6.7	80.0	100
Art	0.0	0.0	0.0	13.3	86.7	100
Mechanical Drawing	0.0	0.0	13.3	13.3	73.4	100
Foreign Languages	0.0	0.0	0.0	0.0	100	100
Agriculture	0.0	0.0	13.3	13.3	73.4	100
Vocational Guidance	0.0	0.0	26.7	6.7	66.6	100
Journalism	0.0	0.0	0.0	13.3	86.7	100
Others	0.0	0.0	0.0	6.7	93.3	100

As indicated in Table VI, general science, 100 per cent; physics, 70.7 per cent; history, 33.3 per cent; and mathematics, 32.3 per cent were the subjects that were reported as most supplemented by aviation education in South Dakota. The only subject that was reported as being integrated much or very much of the time was physics, 10.1 per cent. Commercial subjects, industrial arts, art, mechanical drawing, foreign languages, and agriculture were not integrated in the schools reporting from South Dakota. Geography, international relations, biology, and chemistry were reported as not being integrated by 89.9 per cent of the administrators.

TABLE VI

PERCENTAGES OF INTEGRATION OF AVIATION EDUCATION
WITH OTHER COURSES IN THE SECONDARY SCHOOLS OF
THE STATE OF SOUTH DAKOTA

Course	Percentage of Integration					Total
	Very Much	Much	Little	Very Little	Not At All	
English and Language Arts	0.0	0.0	0.0	22.2	77.8	100
History	0.0	0.0	33.3	0.0	66.7	100
Economics	0.0	0.0	10.1	10.1	79.8	100
Geography	0.0	0.0	10.1	0.0	89.9	100
Civics or Problems of Democracy	0.0	0.0	0.0	0.0	100	100
International Relations	0.0	0.0	0.0	10.1	89.9	100
Mathematics	0.0	0.0	22.2	10.1	67.7	100
Biology	0.0	0.0	0.0	10.1	89.9	100
Physics	0.0	10.1	50.5	10.1	29.3	100
General Science	0.0	0.0	77.8	22.2	0.0	100
Chemistry	0.0	0.0	10.1	0.0	89.9	100
Commercial Subjects	0.0	0.0	0.0	0.0	100	100
Industrial Arts	0.0	0.0	0.0	0.0	100	100
Art	0.0	0.0	0.0	0.0	100	100
Mechanical Drawing	0.0	0.0	0.0	0.0	100	100
Foreign Languages	0.0	0.0	0.0	0.0	100	100
Agriculture	0.0	0.0	0.0	0.0	100	100
Vocational Guidance	0.0	0.0	22.2	0.0	77.8	100
Journalism	0.0	0.0	0.0	0.0	100	100
Others	0.0	0.0	0.0	0.0	100	100

Table VII reveals the extent of the integration of aviation education with other courses in the secondary schools in Minnesota. General science was integrated in all the schools offering aviation education in this manner. Other courses with a high frequency of integration were physics, 93.4 per cent; chemistry and industrial arts, 53.4 per cent; and mathematics, 53.3 per cent. This table shows a low frequency of integration for foreign languages, 13.3 per cent; and English and language arts, and journalism, 13.4 per cent. The subjects that were integrated much, or very much of the time were physics, 26.7 per cent; general science, 13.4 per cent; and industrial arts, 6.7 per cent. The remainder of the subjects were reported as being integrated little, or very little of the time. The courses not supplemented with aviation education materials and the percentage of administrators reporting were foreign language, 86.7 per cent; English and language arts, and journalism, 86.6 per cent; and international relations, art, and agriculture, 80.0 per cent.

TABLE VII
 PERCENTAGES OF INTEGRATION OF AVIATION EDUCATION
 WITH OTHER COURSES IN THE SECONDARY SCHOOLS OF
 THE STATE OF MINNESOTA

Course	Percentage of Integration					Total
	Very Much	Much	Little	Very Little	Not At All	
English and Language Arts	0.0	0.0	6.7	6.7	86.6	100
History	0.0	0.0	20.0	20.0	60.0	100
Economics	0.0	0.0	20.0	13.3	66.7	100
Geography	0.0	0.0	20.0	6.7	73.3	100
Civics or Problems of Democracy	0.0	0.0	33.4	6.7	59.9	100
International Relations	0.0	0.0	6.7	13.3	80.0	100
Mathematics	0.0	0.0	40.0	13.3	46.7	100
Biology	0.0	0.0	0.0	33.4	66.6	100
Physics	0.0	26.7	46.7	20.0	6.6	100
General Science	6.7	6.7	33.4	53.2	0.0	100
Chemistry	0.0	0.0	20.0	33.4	46.6	100
Commercial Subjects	0.0	0.0	13.3	13.3	73.4	100
Industrial Arts	6.7	0.0	33.4	13.3	46.6	100
Art	0.0	0.0	13.3	6.7	80.0	100
Mechanical Drawing	0.0	0.0	6.7	20.0	73.3	100
Foreign Languages	0.0	0.0	0.0	13.3	86.7	100
Agriculture	0.0	0.0	6.7	13.3	80.0	100
Vocational Guidance	0.0	0.0	13.3	13.3	73.4	100
Journalism	0.0	0.0	6.7	6.7	86.6	100
Others	0.0	0.0	0.0	6.7	93.3	100

The percentage of secondary schools offering co-curricular aviation activities is shown in Table VIII. The Civil Air Patrol, reported by 17.1 per cent of the administrators, was the activity most frequently offered. Model airplane clubs were in operation at 3.8 per cent of the schools. Other activities reported were amateur radio and civil defense aircraft spotting. The highest frequency of offering was in Minnesota where 36 per cent of the schools reported co-curricular aviation activities, while South Dakota reported only 15.4 per cent.

TABLE VIII

PERCENTAGES OF USE OF CO-CURRICULAR AVIATION
ACTIVITIES IN SECONDARY SCHOOLS OF NORTH
DAKOTA, SOUTH DAKOTA AND MINNESOTA

Activity	North Dakota	South Dakota	Minne- sota	All Schools
Civil Air Patrol	11.1	12.1	27.7	17.1
Air Scouts	0.0	0.0	0.0	0.0
Aviation Club	0.0	0.0	0.0	0.0
Model Airplane Club	2.7	3.3	5.6	3.8
Others	2.7	0.0	2.7	1.9

The administrators from the secondary schools not offering aviation education reported that a number of problems were responsible for the lack of it in the school program. Table IX shows that slightly over 89 per cent reported the lack of qualifications on the part of the staff as a reason for not offering

aviation education. Other reasons frequently reported were lack of interest on the part of the public, 57.1 per cent; lack of interest on the part of the students, 53.6 per cent; and expenses involved, 51.8 per cent. Some additional reasons given by the administrators were: "No facilities," "Moving to a new building," "Crowded classrooms," "Basic science more important," "Ample time later in life," and "High schools shouldn't offer."

TABLE IX

PERCENTAGES OF FREQUENCY OF EIGHT REASONS FOR NOT OFFERING AVIATION EDUCATION
IN THE SECONDARY SCHOOLS OF NORTH DAKOTA, SOUTH DAKOTA, AND MINNESOTA

Reason	Percentage of Frequency			All Schools Not Offering Aviation Education
	North Dakota	South Dakota	Minnesota	
Lack of interest on part of the adminis- tration.	36.8	28.6	37.5	33.9
Lack of interest on part of students	52.6	42.9	68.7	53.6
Lack of interest on part of the public	73.7	52.4	43.8	57.1
Lack of qualifications of the staff	100	76.2	93.8	89.2
Lack of Materials available	36.8	42.9	31.2	37.5
Inadequate enrollment	31.6	19.0	12.5	21.4
Expenses involved	52.6	57.1	45.0	51.8
Conflict with curriculum	57.9	42.9	45.0	48.2

The administrators of twenty-two schools indicated they were planning to offer aviation education in the future while thirty-four indicated no such plans. Two administrators reported they planned to offer it in 1957-58, two in 1958-59, and eighteen as soon as possible.

Some of the administrators who answered "no" to the question relating to the offering, made comments similar to the following:

Aviation education should be a part of the school program but our financial status at present does not allow the inclusion of new material.

In this age of 'flight' we certainly hope to revise the course we offered during the war; obtain a qualified teacher and again have aeronautics.

We are interested in aviation education, but we are using every classroom every period of the day now. The only way we can add something to the curriculum is to omit something now offered.

Fifteen administrators indicated they would integrate aviation with other courses, whereas nine reported they planned to offer it as a basic course and two planned to offer it as a co-curricular activity.

Table X summarizes the replies from the schools planning to offer aviation education in the future.

TABLE X
NUMBER OF SCHOOLS PLANNING TO OFFER AVIATION EDUCATION

Plans	Number of Schools			Total
	North Dakota	South Dakota	Minnesota	
Schools planning to offer aviation education	7	6	9	22
Schools that do not plan to offer aviation education	13	15	6	34
Plan to offer aviation education in 1957-58	1	1	0	2
Plan to offer aviation education in 1958-59	0	1	1	2
Plan to offer aviation education in 1959-60	0	0	0	0
Plan to offer aviation education as soon as possible	6	4	8	18
Plan to offer aviation education as a basic course	2	2	5	9
Plan to integrate aviation education with other courses	5	6	4	15
Plan to offer aviation education as a co-curricular activity	0	0	2	2

Opinions of Administrators Toward Aviation Education

The administrators were asked to indicate their opinions as to the place of aviation education in the secondary school by responding to seven questions. These responses are tabulated and presented in Table XI. All questions were not checked by every administrator, therefore, the percentages for each

state do not equal 100 per cent.

A majority of the administrators, 60.9 per cent, believed that aviation education should be included in the high school program. Almost 39 per cent felt it should be offered as a separate course and 60 per cent believed it should be integrated with other courses. The majority of the administrators were opposed to flight training and federal or state aid for aviation education.

TABLE XI

PERCENTAGES SHOWING THE GENERAL VIEWS OF HIGH SCHOOL ADMINISTRATORS
OF NORTH DAKOTA, SOUTH DAKOTA, AND MINNESOTA TOWARD
AVIATION EDUCATION IN THE SECONDARY SCHOOL

Question	Percentage of Administrators							
	North Dakota		South Dakota		Minnesota		All Schools	
	Yes	No	Yes	No	Yes	No	Yes	No
Should aviation education be included in the high school program?	75.0	16.7	87.8	9.1	77.9	19.5	60.9	15.2
Should it be a separate basic course?	28.8	50.0	39.4	51.5	47.2	47.2	38.5	49.5
Should it be integrated with other courses?	61.1	13.9	66.7	26.9	58.1	33.3	60.0	34.6
Should co-curricular activities relating to aviation education be encouraged?	72.0	2.6	63.6	18.1	77.8	19.4	70.5	13.3
Do you favor actual flight training for high school students?	22.2	66.7	15.1	75.8	30.7	69.3	22.9	70.5
Do you favor federal aid for aviation education?	30.7	50.0	24.2	60.6	30.7	52.8	32.1	55.3
Do you favor state aid for aviation education?	19.4	52.8	30.3	54.5	41.7	47.2	30.5	51.4

Ten objectives of aviation education were presented to the high school administrators for their opinions as to the importance of those objectives to high school students. The administrators were requested to rate each objective as very important, important, fairly important, of some importance, and unimportant. Table XII pertains to all three states, whereas Table XIII, page 59; Table XIV, page 61; and Table XV, page 63, are concerned with North Dakota, South Dakota, and Minnesota, respectively. The percentages used in these tables approach 100 per cent, but are not equal to it in every case, since some administrators did not respond to all of the objectives. The objective, an understanding of how the airplane has changed geographical relationships, was given the highest rating. It was rated as very important or important by 71.5 per cent of the administrators. The next most important objective, an understanding of the social, economic, and political implications of aviation, was reported as very important or important by 60.4 per cent of the administrators. The least important of the objectives was a general knowledge and understanding of the parts of an aircraft, which was rated of some importance or unimportant by 47.6 per cent. Table XII indicates the opinions of the administrators in North Dakota, South Dakota, and Minnesota as to the importance of the objectives to the student in the secondary school.

TABLE XII

ANALYSIS OF THE VIEWS OF 105 SECONDARY SCHOOL ADMINISTRATORS
FROM NORTH DAKOTA, SOUTH DAKOTA AND MINNESOTA, RELATIVE
TO CERTAIN SELECTED OBJECTIVES OF AVIATION EDUCATION

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
Possession of an adequate reading and speaking aviation vocabulary	15.3	34.3	31.4	14.3	0.0
Knowledge of the importance of weather and climate to aviation	16.2	31.4	34.3	13.4	0.9
Knowledge of the history and growth of aviation	3.8	29.6	34.3	23.8	2.8
A general knowledge and understanding of the simple scientific principles of flight	15.3	34.3	38.1	10.6	0.9
A general knowledge and understanding of the parts of an aircraft	4.8	11.4	34.3	31.4	16.2
An appreciation of the services rendered by airports and associated personnel	5.7	37.1	21.9	20.9	0.9
Familiarity with existing and needed basic Gov't services, regulations, and relationships in aviation	6.7	26.2	29.6	30.5	2.8
An understanding of the effects of air transportation on various levels of international relationships	20.0	35.2	30.5	8.5	2.8

TABLE XII (continued)

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
An understanding of the social, economic, and political implications of current and future aviation developments	21.0	39.4	22.9	13.3	0.9
An understanding of how the airplane has changed geographic relationships: particularly in time, place, and distance and mankind's attitude toward waterways, landmasses, and land and water barriers.	37.2	34.3	20.0	8.5	0.0

The administrators of North Dakota selected an understanding of how the airplane has changed geographic relationships as the most important objective to the high school student with 63.8 per cent reporting it as very important or important. Possession of an adequate reading and speaking aviation vocabulary followed with 58.3 per cent selecting it as very important or important. The objective, a general knowledge and understanding of the parts of an aircraft, was designated the least important as 41.6 per cent of the administrators rated it of some importance, or unimportant. The views of the administrators from North Dakota are shown in Table XIII.

TABLE XIII

ANALYSIS OF THE VIEWS OF THIRTY-SIX SECONDARY SCHOOL
ADMINISTRATORS FROM NORTH DAKOTA RELATIVE TO CERTAIN
SELECTED OBJECTIVES OF AVIATION EDUCATION

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
Possession of an adequate reading and speaking aviation vocabulary	19.4	38.9	19.4	13.9	0.0
Knowledge of the importance of weather and climate to aviation	16.7	30.5	36.1	11.1	0.0
Knowledge of the history and growth of aviation	5.5	27.8	27.8	27.8	2.8
A general knowledge and understanding of the simple scientific principles of flight	19.4	30.5	36.1	11.1	0.0
A general knowledge and understanding of the parts of an aircraft	2.8	16.7	36.1	22.2	19.4
An appreciation of the services rendered by airports and associated personnel	0.0	36.1	36.1	22.2	0.0
Familiarity with existing and needed basic Gov't services, regulations, and relationships in aviation	0.0	27.8	33.3	36.1	0.0
An understanding of the effects of air transportation on various levels of international relationships	16.7	30.5	36.1	8.3	2.8

TABLE XIII (continued)

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
An understanding of the social, economic, and political implications of current and future aviation developments	16.7	33.3	30.5	16.7	0.0
An understanding of how the airplane has changed geographic relationships; particularly in time, place, and distance and mankind's attitude toward waterways, landmasses, and land and water barriers	33.3	30.5	25.0	5.5	0.0

The opinions of the administrators of South Dakota relative to the ten objectives are shown in Table XIV. An understanding of how the airplane has changed geographic relationships was reported as very important or important by 69.6 per cent of the administrators. This was followed by an understanding of the social, economic, and political implications of aviation developments which was reported by 60.6 per cent of the administrators as very important or important. The least important objective was reported to be a general knowledge and understanding of the parts of an aircraft, with 42.4 per cent of the administrators rating it as of some importance or unimportant.

TABLE XIV

ANALYSIS OF THE VIEWS OF THIRTY-THREE SECONDARY SCHOOL
ADMINISTRATORS FROM SOUTH DAKOTA RELATIVE TO CERTAIN
SELECTED OBJECTIVES OF AVIATION EDUCATION

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
Possession of an adequate reading and speaking aviation vocabulary	9.9	30.3	36.7	18.1	0.0
Knowledge of the importance of weather and climate to aviation	18.1	18.1	27.2	15.1	3.3
Knowledge of the history and growth of aviation	0.0	18.1	36.7	27.2	3.3
A general knowledge and understanding of the simple scientific principles of flight	18.1	33.3	18.1	21.2	0.0
A general knowledge and understanding of the parts of an aircraft	12.1	12.1	27.2	30.3	12.1
An appreciation of the services rendered by airports and associated personnel	9.9	33.3	36.7	12.1	3.3
Familiarity with existing and needed basic Gov't services, regulations, and relationships in aviation	12.1	21.2	27.2	18.1	0.7
An understanding of the effects of air transportation on various levels of international relationships	15.1	42.4	21.2	18.1	0.0

TABLE XIV (continued)

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
An understanding of the social, economic, and political implications of current and future aviation developments	21.2	39.4	21.2	12.1	0.0
An understanding of how the airplane has changed geographic relationships; particularly in time, place, and distance and mankind's attitude toward waterways, landmasses, and land and water barriers.	27.2	42.4	27.2	3.2	0.0

Table XV shows that 75 per cent of the administrators in Minnesota felt that an understanding of how the airplane has changed geographic relationships was the most important objective, since they rated it as very important or important. This objective was closely followed by an understanding of the social, economic, and political implications of aviation developments, which was selected as very important or important by 69.4 per cent of those responding. The objective of least importance was a general knowledge and understanding of the parts of an aircraft, which was rated as of some importance or unimportant by 58.4 per cent of the administrators from Minnesota.

TABLE XV

ANALYSIS OF THE VIEWS OF THIRTY-SIX SECONDARY SCHOOL
ADMINISTRATORS FROM MINNESOTA, RELATIVE TO CERTAIN
SELECTED OBJECTIVES OF AVIATION EDUCATION

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
Possession of an adequate reading and speaking aviation vocabulary	16.7	33.3	38.9	11.1	0.0
Knowledge of the importance of weather and climate to aviation	8.3	38.9	36.1	13.9	2.8
Knowledge of the history and growth of aviation	5.5	36.1	38.9	16.7	2.8
A general knowledge and understanding of the simple scientific principles of flight	8.3	36.1	52.8	0.0	2.8
A general knowledge and understanding of the parts of an aircraft	0.0	5.5	36.1	41.7	16.7
An appreciation of the services rendered by airports and associated personnel	8.3	41.7	22.2	27.8	0.0
Familiarity with existing and needed basic Gov't services, regulations, and relationships in aviation	8.3	30.5	27.9	30.5	2.8
An understanding of the effects of air transportation on various levels of international relationships	27.8	33.3	33.3	0.0	5.6

TABLE XV (continued)

Objective	Percentage of Importance				
	Very impt	Impt	Fairly impt	Some impt	Un- impt
An understanding of the social, economic, and political implications of current and future aviation developments	25.0	44.4	16.7	11.1	2.8
An understanding of how the airplane has changed geographic relationships; particularly in time, place, and distance and mankind's attitude toward waterways, landmasses, and land and water barriers	50.0	25.0	19.4	5.6	0.0

The problem of securing qualified teachers was reported by 75.2 per cent of the administrators to be the most important obstacle to the development of aviation education programs in the secondary school. Table XVI indicates financing of the program, which was checked by 58.1 per cent of the administrators, to be the second most important problem. Conflict with the curriculum, selected by 55.2 per cent of the administrators, was third in importance. This was followed by lack of public support, which was reported as a problem by 54.8 per cent of those replying to the questionnaire. Other reasons listed by administrators were: "crowded schools," "opposition of present administration," "other basic courses more important," "failure of administration to promote aviation education," and "not school's function."

TABLE XVI

PERCENTAGES INDICATING PROBLEMS IN THE PROMOTION
OF AVIATION EDUCATION IN THE SECONDARY SCHOOLS
OF NORTH DAKOTA, SOUTH DAKOTA, AND MINNESOTA

Problem	Percentage of Schools			
	North Dakota	South Dakota	Minnesota	All Schools
Lack of student interest	50.0	51.5	47.2	49.4
Lack of public support	47.2	66.7	50.0	54.8
Lack of qualified teachers	75.0	81.8	69.4	75.2
Lack of texts and supplementary materials	36.1	48.7	47.2	43.8
Lack of information about the program	38.9	48.7	50.0	45.7
Lack of community resources	33.3	45.4	41.7	40.0
Financing the program	61.1	63.6	50.0	58.1
Conflict with curriculum	58.1	54.5	52.8	55.2
Inadequate enrollment	30.5	48.7	27.8	35.2

CHAPTER IV

SUMMARY AND RECOMMENDATIONS

This study was an attempt to find to what extent aviation education was offered in the high schools of North Dakota, South Dakota, and Minnesota. An attempt was also made to ascertain the approach to and control of this educational practice in these states and the problems facing this type of education.

The information for this study was obtained by the means of a survey. A questionnaire was sent to the administrator of each of forty high schools in North Dakota, South Dakota, and Minnesota. Of the 120 questionnaires mailed, a total of 105, or 87.5 per cent were returned. The information obtained from these questionnaires formed the basis for the study and has been presented in the preceding chapter.

Findings

The following items are listed in the order in which they appear in Chapter III.

1. Aviation education of some type is offered in 46.6 per cent of the 105 schools cooperating in this study.

2. Aviation education is offered as a basic course in only 9.5 per cent of the schools surveyed, but in 20.4 per cent of the schools offering aviation education.

3. Aviation education is integrated with other courses

in 37.1 per cent of the schools responding to the questionnaire, and 79.6 per cent of the schools offering aviation education.

4. General science, physics, and mathematics are the courses with which aviation is most frequently integrated.

5. Co-curricular aviation activities were reported as part of the secondary school program by 22.8 per cent of the administrators. Civil Air Patrol, the most popular activity, was offered by 17.1 per cent of the schools.

6. Lack of qualifications on the part of the staff, lack of interest on the part of the public, and lack of interest on the part of the students were the three main reasons for not offering aviation education.

7. Twenty-two administrators reported that they would offer aviation education in the near future.

8. Administrators from 60.9 per cent of the schools expressed the opinion that aviation should be included in the high school program; 38.5 per cent recommended a basic course, and 60 per cent would integrate it with other courses.

9. Co-curricular aviation activities were favored by 70.5 per cent of the administrators, whereas only 22.9 per cent favored actual flight training for high school students.

10. The majority of administrators were opposed to state or federal aid for aviation education.

11. The objective, an understanding of how the airplane has changed geographic relationships, was listed as the most important aviation education objective for high school students

by 71.5 per cent of these replying to the questionnaire.

12. A general knowledge and understanding of the parts of an aircraft was selected by 47.6 per cent of the administrators as the least important objective of aviation education for high school students.

13. Lack of qualified teachers, financing the program, and conflict with the curriculum were reported as the greatest problems opposing the promotion of aviation education in the high schools.

Conclusions

The conclusions that follow are based upon an analysis of the data presented in the preceding chapter.

1. There is a need for more aviation education in North Dakota, South Dakota, and Minnesota, since 53.4 per cent of the schools reporting do not offer it in the secondary school.

2. Courses in aviation education, either basic or integrated, are not available to enough students.

3. Teacher-training institutions are not producing enough teachers with a working knowledge of aviation, its importance, and its effects.

4. Administrators and teachers are not aware of the numerous sources from which texts and supplemental materials can be obtained. They are also not aware of the various agencies that are available to aid in the promotion of aviation education.

5. The public is not cognizant of the importance of aviation education.

Recommendations

The following recommendations are presented as an outgrowth of the material in the preceding chapters.

1. Aviation education should be made available to all high school students.

2. Provisions should be made in the high school curriculum for the teaching of aviation education, that is, the impact of the political, economic, and cultural aspects of aviation upon society. This could be achieved in special classes, by integration, or through a combination of both.

3. There should be more adequate preparation for the teaching of aviation education. Teachers' colleges, and education departments of colleges and universities, should modify their programs to acquaint pre-service teachers with a recognition of the effect of the air age upon the future lives of their pupils. The integration of aviation materials with present secondary programs should be encouraged.

4. Provisions should be made for more adequate in-service education for the teaching of aviation education. This can be accomplished by: (a) in-service education in this field in the secondary school; and (b) the establishment of aviation workshops by the institutions of higher learning in this geographical area.

5. Education leaders should institute a positive program of public relations to acquaint the public with the importance of aviation education.

6. Additional research relative to the extent and types of aviation education offered in the secondary schools of North Dakota, South Dakota, and Minnesota should be initiated. This research should be concerned with a larger number of schools from these states.

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APPENDICES

APPENDIX A: Preliminary Questionnaire



THIS SIDE OF CARD IS FOR ADDRESS

Does your high school offer any of the following?

	Yes	No
Specialized basic courses in aviation education - - - - -	_____	_____
Specialized shop courses in aviation education - - - - -	_____	_____
Flight course in aviation - - - -	_____	_____
Does your high school integrate aviation education with other subjects? - - -	_____	_____
Does your school offer any co-curricular activities relating to aviation? - - - -	_____	_____

APPENDIX B: Questionnaire

2205 - 11th Ave. N.
Grand Forks, N. D.
November 30, 1956

Dear High School Administrator:

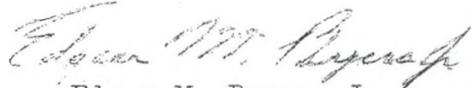
I am making a study of aviation education in North Dakota, South Dakota and Minnesota as a part of the requirements for the Master of Science Degree at the University of North Dakota. Dr. A. L. Gray, Associate Professor of Psychology and Education, University of North Dakota, is the advisor of the study.

In order to complete the study, it is necessary that I have the enclosed questionnaire on aviation education completed. I would sincerely appreciate it if you would take time to fill it out and return it to me by December 20, 1956. Please check the responses or fill in the blanks with the information that pertains to your system and your views on aviation education. Any other practices which you are using, and any suggestions or criticisms you may have will be especially appreciated. Please write them in the comment section. I have enclosed a self-addressed, stamped envelope for your use in returning the questionnaire to me.

If a summary of this study or more information on the proposed Aviation Education Workshop is desired, please indicate the name and address of interested persons in the comment section of the questionnaire, or if you prefer, send them to me in a separate communication.

Thank you for your cooperation and information.

Sincerely,


Edgar M. Byers, Jr.

Please return this copy by 20 December 1956 to:

Edgar M. Byers, Jr., 2205 - 11th Ave. N., Grand Forks, N.D.

A. General

1. What is your high school enrollment?
 100-199 200-299 300-449
 450-599 600-999 1,000 & over
2. What is the approximate population of your city?
 0-500 501-2,500 2,501-5,000
 5,001-10,000 10,001-25,000
 25,001 & over
3. What is the type of organization of your system?
 8-4 6-6 6-3-3 other

B. Program

1. Do you offer aviation education in the high school?
 Yes No
2. If aviation education is offered, how long has it been offered? (Count present year as one year)
 One year Two years
 Three years Over three years
3. If aviation education is offered, is it offered as a basic aviation course?
 Yes No
 Credit
 Non-credit
 Length in weeks

 (Course Title)
 Grade Level
4. If aviation education is offered, is it integrated with other courses?
 Yes No
5. If aviation is integrated with other courses, to what extent is it used to supplement the following?

	Very Much	Much	Little	Very Little	Not At All
English & Language Arts	_____	_____	_____	_____	_____
History	_____	_____	_____	_____	_____
Economics	_____	_____	_____	_____	_____
Geography	_____	_____	_____	_____	_____
Civics or Problems of Democracy	_____	_____	_____	_____	_____
International Relations	_____	_____	_____	_____	_____
Mathematics	_____	_____	_____	_____	_____
Biology	_____	_____	_____	_____	_____
Physics	_____	_____	_____	_____	_____
General Science	_____	_____	_____	_____	_____
Chemistry	_____	_____	_____	_____	_____
Commercial Subjects	_____	_____	_____	_____	_____
Industrial Arts	_____	_____	_____	_____	_____
Art	_____	_____	_____	_____	_____
Mechanical Drawing	_____	_____	_____	_____	_____
Foreign Languages	_____	_____	_____	_____	_____
Agriculture	_____	_____	_____	_____	_____
Vocational Guidance	_____	_____	_____	_____	_____
Journalism	_____	_____	_____	_____	_____
Others	_____	_____	_____	_____	_____

6. Do you offer any of the following co-curricular aviation activities?

Civil Air Patrol
 Air Scouts
 Aviation Club
 Model Airplane Club

_____ (Other)

7. If aviation education is not offered in your system, please indicate the reasons.

Lack of interest on part of the administration.
 Lack of interest on part of the students.
 Lack of interest on part of the public.
 Lack of qualifications of the staff.
 Lack of available materials.
 Inadequate enrollment.
 Expenses involved.
 Conflict with curriculum.

_____ (Other reasons)

8. If aviation education is not offered at the present time, do you plan to offer it in the near future?

Yes No
 1957-58
 1958-59
 1959-60
 As soon as possible
 As a basic course
 Integrate with other courses
 As a co-curricular activity

C. General Views

1. Should aviation education be included in the high school program?

Yes No

2. Should it be a separate, basic course?

Yes No

3. Should it be integrated with other courses?

Yes No

4. Should co-curricular activities relating to aviation education be encouraged?

Yes No

5. Do you favor actual flight training for high school students?

Yes No

6. Do you favor federal aid for aviation education?

Yes No

7. Do you favor state aid for aviation education?

Yes No

8. Would you or would teachers in your system be interested in attending a two week aviation workshop (for graduate credit) to be held at the University of North Dakota?

Yes No

9. If the answer to No. 8 is "yes", when would you prefer to have the workshop scheduled?

During the summer session (June 17-Aug.10,1957)
 After the completion of the summer session

Do you wish a copy of the summary of this study?

_____ Yes _____ No

Do you wish more information about the proposed aviation
education workshop?

_____ Yes _____ No

D. Comments