



# **North Texas Aviation Education Initiative**

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

## **Primary and Secondary School Outreach Programs and Recommendations**

November 2009



# North Texas Aviation Education Initiative

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

## PRIMARY AND SECONDARY SCHOOL OUTREACH PROGRAMS AND RECOMMENDATIONS

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## PRIMARY AND SECONDARY SCHOOL OUTREACH PROGRAMS AND RECOMMENDATIONS

### A. GLOSSARY

This section defines acronyms and abbreviations used throughout the document.

<b>Term</b>	<b>Description</b>
A&P	Airframe & Powerplant
ABIA	Austin-Bergstrom International Airport
ACE	Aviation Career Education
AOPA	Aircraft Owners and Pilots Association
CAP	Civil Air Patrol
CERES	Center for Educational Resources
CTE	Career and Technical Education Programs
DFW	Dallas/Fort Worth International Airport
EAA	Experimental Aircraft Association
ED	U.S. Department of Education
EDU	Educators
ELE	Elementary School
FAA	Federal Aviation Administration
GAMA	General Aviation Manufacturer's Association
HIG	High School
JRH	Junior High School
MSAP	Magnet Schools Assistance Program
NAAA	National Agricultural Aviation Association
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NBAA	National Business Aviation Association
NCAE	National Coalition for Aviation Education
PDF	Portable Document Format
POS	Programs of Study
PRE	Pre-School/Kindergarten
ROTC/JROTC	Reserve or Junior Reserve Officers' Training Corps
SOL	Standards of Learning
SWUTC	Southwest University Transportation Center
THECB	Texas Higher Education Coordinating Board
TSTEM	Texas Science, Technology, Engineering and Math
TTI	Texas Transportation Institute
TxDOT-AVN	Texas Department of Transportation – Aviation Division
U.S.	United States
UAA	University Aviation Association
UTCM	University Transportation Center for Mobility
WAI	Women in Aviation, International



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## B. INTRODUCTION

The aviation industry depends, to a great degree, on the involvement of youth at an early age to meet its workforce needs. The number of student pilots provides some insight into the number of future commercial pilots, and the issuance of necessary and required licenses also provides a sense of what the future holds in terms of the workforce. However, this relationship is less clear in aviation-related professions. Regardless, exposure to career professions and opportunities is of the utmost value in terms of future industry recruitment.



Source: [www.capmembers.com/aerospace\\_education/](http://www.capmembers.com/aerospace_education/)

Moreover, beyond pilots, maintenance technicians and air traffic controllers, many aviation careers are not among the more widely-known jobs, and many people “fall” into positions by chance after first following another career path. Graduates of programs in business, management, finance, economics, planning and others can ultimately find themselves working in the aviation field, having previously been unaware of such opportunities. The same is true of graduates of many technical programs.

In many of these cases, a more aviation-centric education would have been of benefit to both the employee and the employer in terms of greater job satisfaction, increased productivity and reduced training time and costs. For the most part, those in aviation are passionate about their work and their interest is personal. This report, as part of the North Texas Aviation Education Initiative, details a comprehensive approach to enhancing existing, and creating, new activities at the primary and secondary education levels.

## C. THE INFLUENCE OF PRIMARY AND SECONDARY SCHOOL OUTREACH

Getting young students interested in any academic subject can be a difficult task. The romantic allure often associated with aviation can work to its advantage by creating interest in the field at an earlier age than for other disciplines. Understanding these dynamics is critical to developing programs that attract students to aviation so they become involved in aviation organizations and are excited about aviation careers.

The first step is raising awareness of the programs currently available to students which will ultimately lead them to programs that are in place at the high school, community college and university levels. This is a critical path to knowing and understanding the career options that may be available to them and the level of education needed to achieve them. Exposing students at an early age to the field of aviation involves aviation and aerospace-related curricula for all grade levels and the involvement of groups and associations that can foster additional learning opportunities both inside and outside of the classroom.

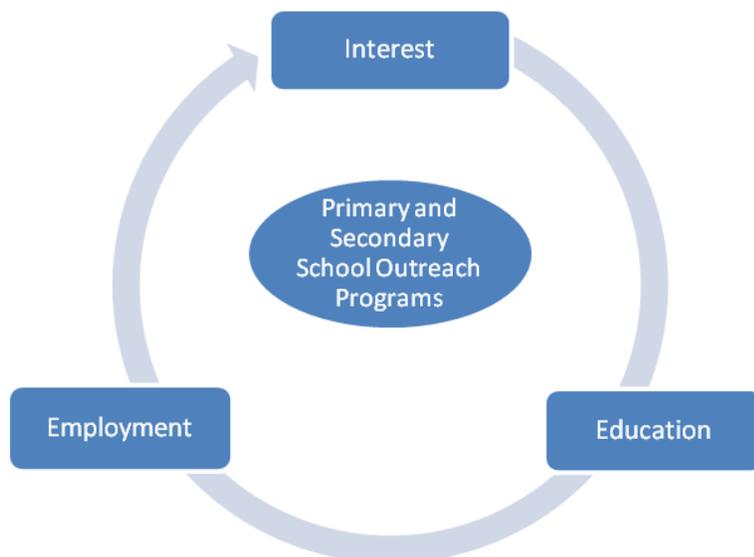


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Exhibit 1 depicts this important role. This cycle was illustrated and described in the Program Coordination Report compiled earlier in this study. Outreach at the primary and secondary level not only influences this system at the interest level but also at the education and employment levels. Early interest, driven by outreach, can direct young students to the colleges and universities with aviation programs and/or to jobs they find rewarding and exciting.

## Exhibit 1: The Influence of Primary and Secondary School Outreach



Source: Aviation Education Team

This report begins with a definition of the primary and secondary educational levels followed by an overview of the organizations involved in aviation education and outreach. The discussion of the significant resources readily available for use and implementation is followed by a discussion of various programs that may be adopted for specific aviation purposes. Some are in use today, even in aviation, while others are not. This is followed by a series of recommendations intended for full implementation of aviation education and outreach efforts in the K-12 educational environment.

### Definition of Primary and Secondary schools

Depending on the school district, the definition of primary and secondary schools may vary. However, the range of grade levels included in these two categories runs from kindergarten through twelfth grade. School districts encompass elementary schools and high schools, but variations may occur in the middle grades depending on the use of intermediate and/or middle school designations. Middle schools can be thought of as secondary schools while elementary schools typically go through the fourth or fifth grade. Exhibit 2 illustrates the differences in levels and variations in schools.



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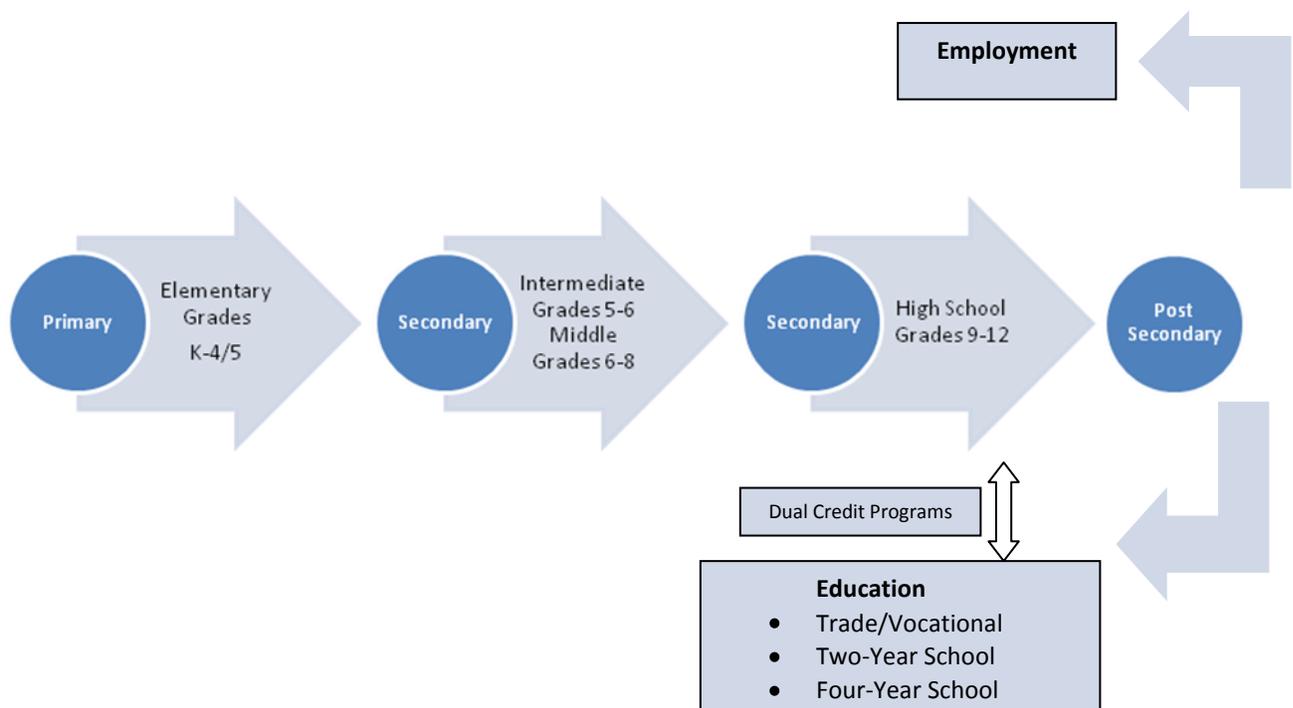
## Exhibit 2: Typical Primary and Secondary Grade Level Ranges by Classification and School Type

Educational Level	Grade Level
Primary Level	K-4/5
Secondary Level	6-12
School Level/Type	Grade Level
Elementary School	K-5
Intermediate School	5-6
Middle School	6-8
High School	9-12

Source: Aviation Education Team

Exhibit 3 graphically depicts the educational process through the primary and secondary levels. Following graduation from high school, individuals have a choice to pursue employment opportunities or continue their education. Additional educational opportunities could involve a trade or vocational school where students can earn certificates and on-the-job-experience. It may also include two-year colleges and four-year colleges and universities where experience and certificates may be earned in addition to college degrees.

## Exhibit 3: Graphical Depiction of School Grade level Flow



Source: Aviation Education Team



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For the purposes of this analysis, resources identified for primary and secondary schools are by specific school grade, where possible, and by primary or secondary grade level at a minimum.

## Organizations Engaged in Aviation Education and Outreach

Numerous organizations—governmental, non-profit, and trade—are involved in disseminating educational and outreach materials intended to help students of all ages become interested in aviation and exposed to the many facets it entails both in terms of advancing educational interests and identifying career opportunities. There exists a significant trove of materials and resources available to teachers and others for immediate implementation. Among the leading organizations with aviation education and resource materials are the following:

- Governmental
  - Federal Aviation Administration (FAA);
  - National Aeronautics and Space Administration (NASA);
  - Texas Department of Transportation – Aviation Division (TxDOT-AVN), and
  - Texas Transportation Institute (TTI).
- Industry Trade Associations/Organizations
  - National Business Aviation Association (NBAA);
  - Aircraft Owners and Pilots Association (AOPA);
  - National Association of State Aviation Officials (NASAO), and
  - Experimental Aircraft Association (EAA).
- Non-Profit Organizations
  - Civil Air Patrol (CAP);
  - University Aviation Association (UAA);
  - Women in Aviation, International (WAI), and
  - National Coalition for Aviation Education (NCAE).
- Educational Institutions in North Central Texas
  - Mountain View College;
  - Tarrant County Community College;
  - Paris Junior College;
  - University of North Texas, Denton, and
  - University of Texas, Arlington.



While this is not an exhaustive list, these entities serve as modules for the production and dissemination of aviation educational resources. They recognize the significance in investing in the future by educating younger generations. Additionally, as other colleges and universities in the region develop aviation programs, they should work to reach out to primary and secondary institutions to recruit and attract students to aviation and their schools. It is expected that this effort would be galvanized by the development of an integrated educational system across many levels and in cooperation with industry.

Exhibit 4 shows the relationship of these entities with respect to aviation education and outreach at the primary and secondary levels. It reflects the sources and directional flow of information and resources as well as the responsibilities involved in promoting opportunities in the industry. It also reflects a potential funding model for aviation programs at the primary and secondary level because of this inherent responsibility. While the schools themselves have a certain responsibility to outline career opportunities for their students, it is incumbent upon the industry



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to promote itself. Because aviation incorporates so many curricular elements found in primary and secondary education today, it is a natural fit to teach important science, math and engineering principles and to also showcase exciting and rewarding careers.

## Exhibit 4: Primary and Secondary Educational Outreach Model



Source: Aviation Education Team

## D. AVIATION EDUCATION AND OUTREACH RESOURCES

This section outlines the resource materials available for use by those teaching and working in the primary and secondary school environments. It includes the resources from many of the organizations mentioned earlier. In some cases, the existing and available materials go beyond what is listed here and may change as time goes by. Those seeking to utilize these available resources should consult the website for the most updated information.

### **Federal Aviation Administration (FAA)** ([www.faa.gov/education/](http://www.faa.gov/education/))

The FAA's resources available for primary and secondary students are excellent. Its education website serves as a dissemination point for numerous materials and includes resources for aviation and space enthusiasts, educators, students and steps for developing partnerships with the FAA and other organizations. Detailed curriculum guides designed for grades K-3, elementary, junior high and high school are available at ([www.faa.gov/education/educator\\_resources/curriculum](http://www.faa.gov/education/educator_resources/curriculum)). Other information is available on student activities by grade level, teacher workshops, Aviation Career Education (ACE) Academies and scholarships/grants. Many of these resources are available in PDF format for easy and timely application to classrooms. In addition to printed materials, the FAA's Southwest Region has shown a tremendous willingness to work with others on education programs for the benefit of students. This includes not only providing materials but also providing access to agency facilities for tours.



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The FAA website includes the agency's own materials and, in many cases, the links to materials of other organizations. This makes it an inclusive resource and asset for teachers of all grade levels. The curriculum guides that are available are listed below by grade level. Hyperlinks to the website are included for easy access to these PDF documents.

## K-3 Curriculum

- [Aviation and Space Curriculum Guide, Grades K-3 \(four parts\)](#) (PRE, ELE) This guide provides aviation activities and lessons. Audience: Pre-School/Kindergarten, Elementary.
- [Future Aspiring Aviators, Primary - An Aviation Curriculum Guide K-3](#) (PRE, ELE, EDU) This guide provides activities and lessons that incorporate aviation as a topic utilizing all content areas. Minimal aerospace background is required. Audience: Pre-School/Kindergarten, Elementary, Educators.

## Elementary Curriculum

- [August Martin Activities Book](#) (ELE) Learning activities are based on a biography of the world's first black airline pilot. Audience: Elementary.
- [Aviation Science Activities for Elementary Grades](#) (ELE) Pamphlet contains science demonstrations pertaining to physical properties of air. Audience: Elementary.
- [Exploring Science, K-6](#) (PRE, ELE) Exploring Science is a K-6 hands-on project, 2061/U.S. Department of Education (ED)-based, complete science program that helps integrate the curriculum. Audience: Pre-School/Kindergarten, Elementary.
- [Flying Ace Activities-Aviation Curriculum Guide for Middle Grade Levels \(4-6\)](#) (ELE, EDU) This guide assists teachers who have little or no aviation education in presenting interesting and informative lessons using scientific methodology. Audience: Junior High/Middle School, Educators.
- [National Agricultural Aviation Association \(NAAA\) Curriculum Guide for Elementary Level](#) (ELE, EDU) This guide approaches aviation from the agricultural angle since it affects the daily lives of students through basic needs of food, shelter and clothing. Audience: Elementary, Educators.
- [Teacher's Guide to Aviation Education, Grades 2-6](#) (ELE, EDU) This brochure contains information on aviation as it relates to social studies, communications arts, health, career education and science. Audience: Elementary, Educators.
- [Trip to the Airport](#) (ELE, JRH) This bilingual program contains information in both English and Spanish. Audience: Elementary, Junior High/Middle School.





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## Junior High Curriculum

- [Aviation Curriculum Guide for Middle School Level, Secondary School Level](#) (PDF) (JRH) This guide is designed for teachers and others who work with pre-teens and teenagers. Audience: Junior High/Middle Schools.
- [Fostering Aviation Activities, Junior High Level - An Aviation Curriculum Guide](#) (PDF) (JRH, EDU) The activities and learning tasks included in this guide are hands-on and serve to demonstrate the motivational aspects of aviation. Audience: Junior High/Middle School, Educators.
- [Model Aerospace Curriculum](#) (PDF) (JRH, HIG, EDU) The objectives of this guide are to develop educators' awareness of the thematic approach to aviation education. Audience: Junior High/Middle School, High School, Educators.
- [NAAA/Curriculum Guide for Secondary](#) (PDF) (JRH, EDU) This guide approaches the topic of agricultural aviation from the agricultural angle since it affects the daily lives of students through basic needs of food, shelter and clothing. Audience: Junior High/Middle School, Educators.

## High School Curriculum

- [Flight and Aviation, Secondary School - An Aviation Curriculum Guide](#) (PDF) (HIG, EDU) This guide indicates how basic principles in various content areas can be taught in the context of aviation and flight. Audience: High School, Educators.
- [Model Aerospace Curriculum](#) (PDF) (JRH, HIG, EDU) This guide's objectives are to develop educators' awareness of the thematic approach to aviation education. Audience: Junior High/Middle School, High School, Educators.

## K-12 Curriculum

- [100 Years of Sustained Power Flight History](#) (PDF) Audience: All students, Educators.
- [Center for Educational Resources \(CERES\) Project](#) This is an extensive library of online and interactive K-12 science education materials for teaching astronomy. The site offers both classroom science projects and reference materials. (NASA) Audience: Educators.
- [Demonstration Aids for Aviation Education \(four parts\)](#) (ELE, JRH, HIG, EDU) This is a set of science teaching strategies which can be used for both independent study and classroom work. Audience: Elementary, Junior High/Middle School, High School, Educators.
- [How We Made the First Flight](#) (PDF) This is a story of how the Wright Brothers made their first flight. Audience: All Students.
- [Main Parts of an Airplane, K-12](#) (PDF) (ELE, JRH, HIG) This is a two-part worksheet identifying the main parts of an airplane and an instrument panel. Audience: Elementary, Junior High/Middle School, High School.
- [NASA Publications/CDs/Videos/Downloads](#) Audience: Educators.
- [Nuestro Primer Vuelo - How We Made the First Flight \(Spanish version\)](#) (PDF) Audience: Educators.
- [Wright Brothers Curriculum Guide](#) (PDF) Audience: Educators.



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- [Wilbur and Orville Activity Book](#) (PDF) Audience: Educators.

In addition to the plethora of information available on its website, the FAA also sponsors and co-sponsors ACE Academies across the country. As noted on the FAA website:

“ACE Academies are summer educational programs for middle and high school students that can last from one day to one week and are co-sponsored by FAA along with many other organizations. The focus is on aviation career exploration with emphasis on opportunities for women and minorities. Students experience instruction in aviation history, the physics of flight, field trips to aviation sites and hands-on activities. Our goal is to have one program in each state and U.S. territory. This program reaches approximately 2,000 students each summer. Dates, locations, cost and age requirements vary according to sponsoring organizations.”



Source: [www.faa.gov/education/student\\_resources/ace\\_camps/photo/index.cfm](http://www.faa.gov/education/student_resources/ace_camps/photo/index.cfm)

Updated information on ACE Academies in Texas and other states can be found by consulting the FAA website at [www.faa.gov/education/student\\_resources/ace\\_camps/](http://www.faa.gov/education/student_resources/ace_camps/).

## Aircraft Owners and Pilots Association (AOPA) ([www.aopa.org](http://www.aopa.org))

AOPA is a non-profit organization dedicated to general aviation. The organization has available resources for youth education, particularly the *Pilots and Teachers Handbook*. This and other materials are accessible through the website ([www.aopa.org/path](http://www.aopa.org/path)) denoting the path to aviation for students. Other materials include the *Path to Aviation* book that includes sections for teachers, pilots and students. There are also Microsoft PowerPoint presentations available for use in the classroom. The teacher modules include the following 11 sections and accompanying student worksheets. The texts included hyperlinks for easy access to the documents.

- [Module 1: Language](#)  
*How do pilots understand each other?*  
[Student Worksheet](#)
- [Module 2: Aircraft Basics](#)  
*What are the parts of an airplane?*  
[Student Worksheet](#)
- [Module 3: Flight Controls](#)  
*How does a pilot control the airplane?*  
[Student Worksheet](#)
- [Module 4: Forces of Flight](#)  
*How does the airplane fly?*  
[Student Worksheet](#)
- [Module 5: Weight and Gravity](#)  
*Can an airplane be too heavy to fly?*  
[Student Worksheet](#)
- [Module 6: Basic Flight Data](#)  
*What do all those gauges do?*  
[Student Worksheet](#)
- [Module 7: Weather](#)  
*How does the weather affect flying?*  
[Student Worksheet](#)
- [Module 8: Flight Planning](#)  
*How does a pilot know where to fly?*  
[Student Worksheets](#)
- [Module 9: Traffic Patterns](#)  
*How do pilots know where to land?*  
[Student Worksheet](#)
- [Module 10: Computer Tools](#)  
*Can students fly without leaving the classroom?*  
[Student Worksheet](#)



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- **Module 11: Aviation in History**  
*Who are the pioneers and heroes of*

*aviation?*  
[Student Worksheet](#)

AOPA's website also offers aviation career information and flight training resources. Teachers and students interested in aviation should explore the AOPA website for classroom resources and call upon the AOPA regional representative based in Texas for additional information and partnerships with the aviation community.

## **National Business Aviation Association (NBAA) ([www.nbaa.org](http://www.nbaa.org))**

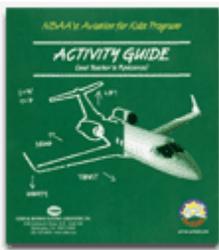
NBAA is the leading advocacy organization for businesses and corporations that use and rely on general aviation in order to operate more efficiently and productively. Like AOPA, the organization has an acute interest in the sustainability of aviation. Likewise, it recognizes the need to get students interested and involved in aviation from an early age. The NBAA has a specially designed activity for children called the AvKids program. It has a website devoted to education for students ([www.nbaa.org/portals/students/](http://www.nbaa.org/portals/students/)) that provides information on careers and links to other relevant aviation education organizations.

The AvKids website is located at [www.avkids.com](http://www.avkids.com) and includes their primary publication *The Flying Office: Aviation Goes to Work*. Other materials available on the website are listed below with hyperlinks imbedded.



### [K8AIT Now Hosted by AvKids.com](#)

The K-8 Aeronautics Internet Textbook, now hosted by AvKids.com, is an internet-based multimedia student workbook and teachers guide created by Cislunar Aerospace, Inc. with support from NASA's Learning Technologies Project: <http://wings.avkids.com>.



### [AvKids Activity Guide Meets National SOLs](#)

The AvKids Aviation Activities Guide & Teachers Resource helps teachers meet their Standards of Learning (SOL) requirements which can be accessed online. The Teachers Guide incorporates science, math, geography and language arts skills to help students in grades 2 through 5 understand aviation. It is also available in French, German, Portuguese and Spanish versions. It can be ordered online at no charge [www.avkids.com/guide/](http://www.avkids.com/guide/).



### [AvKids Added To Microsoft Flight Simulator's "Aviation in the Classroom" Web site](#)

NBAA's AvKids.com has been included among educational references on Microsoft's web site for its popular flight simulator software.



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The NBAA website also has a searchable database to find aviation books for youth as well as games, activities, worksheets and an art gallery, all accessible through the website. The website also includes resources for speakers who communicate with student groups. The resources available here, with hyperlinks, include the following:

- [Duncan Aviation's Careers Day Guidance Manual](#)  
This manual shows how to organize an Aviation Careers Day by following [Duncan Aviation's](#) example. The manual includes handout downloads for "Maintenance Olympics" games and information on setting up an exhibition and static display.
- [Speaker's Kit Outline](#)  
This shows how to structure a Career Day presentation and includes handout downloads and links to other online resources.
- [Careers In Business Aviation](#)  
This Microsoft PowerPoint presentation is designed to explain to high school age students the different areas of aviation, with specific emphasis on business aviation. (PowerPoint, 6.1 MB)
- [International Air Age Education Instructor Guide](#)  
Students should know how aviation improves their lives economically, technologically and socially. *Developed by and provided at this site with permission from the Cessna Aircraft Company.*
- [Elementary Aviation](#)  
An aviation professional, Jacqueline Kruper, a private pilot with over 700 hours of flying, presents aviation to her nephew's kindergarten class in her article from *Woman Pilot* magazine.

Teachers and students interested in aviation should explore the NBAA website for classroom resources and call upon the NBAA regional representative based in Texas for additional information and partnerships with the aviation community.

## **National Association of State Aviation Officials (NASAO) ([www.nasao.org](http://www.nasao.org))**

NASAO represents the state aviation agencies in all 50 states, Guam and Puerto Rico in their collective efforts to plan, program and develop airports across the country and territories. NASAO, through its Center for Aviation Education and Research, participates in its International Aviation Art Contest for children as well as other aviation education efforts. The art contest is held every year in the late winter/early spring and culminates in a presentation during the Texas Aviation Conference.

While NASAO is not currently involved in any large initiatives and does not have curriculum resources available on its website, it does have an information network that could be invaluable for lobbying for aviation education issues. According to its website:

“The NASAO Washington staff presents the views of the states to Congress and the Administration. It works very closely with the Department of Transportation, the National Aeronautics and Space Administration, the Transportation Research Board and the American Association of State Highway and Transportation Officials. It is also the only organization of its type to have an official Memorandum of Understanding with the Federal Aviation Administration. The



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staff also maintains strong relationships with all aviation groups and similar associations such as the National Governors' Association, the Southern Governors Association, and the National Conference of State Legislatures.”

NASAO's position in the aviation community could be leveraged in order to play a more prominent role in aviation education programs going forward, particularly in terms of raising the visibility of the need to engage students in aviation early and pressing for funding mechanisms to accomplish this goal.

## **Texas Department of Transportation - Aviation Division (TxDOT-AVN)**

[www.txdot.gov/business/aviation/default.htm](http://www.txdot.gov/business/aviation/default.htm)

While the focus of TxDOT-AVN is the planning, programming, and construction of general aviation airports, it plays a small role in aviation education. It is included here as it is the state's aviation agency and is in a position to facilitate and foster aviation education programs.

The agency's role involves funding and directing an analysis of aviation and higher education that has sparked a resurgence of interest in aviation education programs in the state. TxDOT-AVN coordinates an annual aviation art contest by soliciting participation from primary and secondary school classrooms across the state. Many teachers get their students involved by creating artwork. In the process, TxDOT is responsible for getting students involved and has created an informal network of teachers and schools across the state. The division is also home to a public-access DVD library. On at least one occasion in the recent past, the division funded an ACE Academy held at Lone Star Executive Airport in Conroe, Texas. This program will be discussed later in this report.

The division, home to knowledgeable professionals, is a technical resource for teachers. Employees routinely travel across the state in the course of their normal work activities and can easily serve as speakers and classroom guests to foster interest and facilitate discussion on aviation-related matters, including support of math and science principles and aviation career opportunities.

Information on the current art contest, its theme, partners, and requirements can be found at [www.txdot.gov/public\\_involvement/aviation/art\\_contest\\_10.htm](http://www.txdot.gov/public_involvement/aviation/art_contest_10.htm).

In addition, the division recently began hosting career expos at its hangar and office facilities at the Austin-Bergstrom International Airport (ABIA) in Austin, TX.

## **Civil Air Patrol (CAP) ([www.gocivilairpatrol.com/html/index.htm](http://www.gocivilairpatrol.com/html/index.htm))**

The Civil Air Patrol is the official civilian auxiliary of the United States (U.S.) Air Force. It is a volunteer organization with three primary areas of focus: emergency services, aerospace education and cadet programs for youth. The webpage for its aerospace education programs and resources can be found at [www.capmembers.com/aerospace\\_education/](http://www.capmembers.com/aerospace_education/). The Civil Air Patrol has its own 'ACE' program – Aviation Connections in Education. Much of the education experience in CAP is for members participating in their programs. Its resource materials are intended for use in lesson plans by teachers who are aerospace education members of CAP. According to the





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CAP aerospace education website, “ACE provides engaging and meaningful cross-curricular aerospace lessons that support Texas Science, Technology, Engineering, and Math (TSTEM) initiatives and enrich the school curricula.” Teachers can join as aerospace members to take advantage of the program’s resources and benefits. Curriculum resources for kindergarten through sixth grade are available. Those interested should consult [www.capmembers.com/aerospace\\_education/aerospace\\_education\\_introduction.cfm](http://www.capmembers.com/aerospace_education/aerospace_education_introduction.cfm) for more information about membership.

Schools or districts wishing to pursue aviation education programs and opportunities should learn about what the CAP offers and discuss programming with the local CAP chapter. The website can be used to locate the nearest chapter. Appendix A shows CAP’s Aerospace Connections in Education program as taken directly from the program website.

## **Texas Transportation Institute (TTI)** (<http://tti.tamu.edu>)

TTI is a state agency and member of the Texas A&M University System. TTI’s primary mission is conducting research in all modes of transportation. The agency’s relevance is due to its role in administering research programs that include the funding of education-related projects. These two programs are the Southwest University Transportation Center (SWUTC) (<http://swutc.tamu.edu/>) and the University Transportation Center for Mobility (UTCM) (<http://utcm.tamu.edu>).

While the primary purpose of these programs is to support post-secondary and graduate level education, TTI also funds education-related projects that center on high school to expose students to



educational and career opportunities beyond the secondary level. These include summer transportation institutes that are provided across the state to generate interest in transportation careers for all students as well as programs designed to enhance the numbers of women and minorities in engineering disciplines, specifically transportation.

Several years ago, SWUTC funded a Texas Summer Aviation Institute that was held in Conroe, Texas at the Lone Star Executive Airport. This two-week program for high school students included activities and field trips that opened the world of aviation to students in ways they had never seen before. The program’s events culminated in the students receiving an introductory airplane flight. This program, funded by SWUTC and developed by TTI, was successful due to its partnerships with the FAA’s Southwest Region, Texas Southern University, Montgomery County, and the Conroe Independent School District.

The partnerships and activities associated with the summer institute serve as a model that could be replicated as an ACE Academy that the FAA could sponsor or as an independent program set up within a school or district to highlight opportunities in aviation to their students. Segments of the program could be used by teachers, and activities could be broken into individual parts.

The two-week program sponsored by SWUTC is documented in the report entitled *The Development of the Texas Summer Aviation Institute and the Implementation of a Pilot Program in Conroe, Texas*. It is accessible via the SWUTC website at <http://swutc.tamu.edu/publications/technicalreports/167456-1.pdf>.



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## Experimental Aircraft Association (EAA) ([www.eaa.org](http://www.eaa.org))

Among the best known youth aviation endeavors today is the Young Eagles program ([www.youneagles.org](http://www.youneagles.org)) sponsored by the Experimental Aircraft Association. This program offers the opportunity for an airplane ride for children between eight and 17 years of age. Exhibit 5 articulates the flight experience as described on the EAA website.

### Exhibit 5: The Young Eagles Flight Experience

#### What will the flight be like?

The biggest question on your mind might be about the actual flight. So what should you expect?

First of all, your pilot will explain what will happen during the flight. This might include talking about the airplane; reviewing an aeronautical chart (or map); identifying reference points during the flight; completing a careful "walk around" preflight inspection of the airplane and identifying the parts that control the airplane.

Once you are ready to go flying, your pilot will help you buckle your seat belt and describe the interior of the airplane, including the instrument panel. Pretty soon, it will be time to go flying!

Once in the air, you'll see the earth and sky in a new and exciting way. You'll experience the wonderful freedom of flight that many people only dream about. If you are like most Young Eagles, you'll remember this experience for the rest of your life.

Most Young Eagle flights last between 15 and 20 minutes. Once back on the ground, there will be additional time for you to ask questions about the flight. Ask away! Your pilot will be happy to tell you more about flying and their particular airplane. And don't forget, you'll also receive an official Young Eagles certificate, which is signed, by your personal pilot and our Chairman Harrison Ford.

We look forward to adding your name to the ever-growing list of EAA Young Eagles!



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Source: EAA

In addition to the Young Eagles program, EAA offers air academies for students ranging in age from 12 to 18. The following descriptions of these programs are taken from the EAA website.

- **EAA Young Eagles Camp** (Ages 12 – 13)  
The EAA Young Eagles Camp is designed as an introduction to the wonderful world of aviation. This program uses small group activities and counselor relationships to present the basics of flight in a science camp format that is a unique combination of fun and discovery.
- **EAA Basic Air Academy** (Ages 14 – 15)  
The EAA Basic Air Academy is the next exciting step through the world of aviation. Each "hands-on" activity is developed for the intermediate student during a classroom and media presentation, specialized laboratory activities and aviation-related demonstrations.
- **EAA Advanced Air Academy** (Ages 16 – 18)  
The EAA Advanced Air Academy provides an atmosphere in which mature students become totally immersed in the world of flight. Ground instruction and introductory recreation flight experiences highlight this action-packed camp. It combines "in-the-air" and "on-the-ground" hands-on activities. The EAA Advanced Air Academy also includes full participation (access to forums, flight-line and all associated activities) in EAA AirVenture Oshkosh.
- **EAA "Spread Your Wings" Camp** (Milwaukee-area, WI, for High School Students)  
At the EAA Spread Your Wings camp, students spend four nights in the EAA Air Academy Lodge while discovering aviation, with flight experiences, hands-on activities and more.

## **National Agricultural Aviation Association (NAAA) [www.agaviation.org](http://www.agaviation.org)**

The NAAA is an industry association that represents "the interests of small business owners and pilots licensed as commercial applicators that use aircraft to enhance food, fiber and bio-fuel production, protect forestry and control health-threatening pests." The organization, through its website, provides information on careers in agricultural aviation. Furthermore, the NAAA website includes access to two curriculum guides. One is designed for elementary students (K-5) and the other is designed for secondary students (6-12). These curriculum guides offer additional perspectives as they cover such topics as agricultural history, the world's food supply and chemistry/pesticide use. This is in addition to the typical aviation topics of geography, meteorology and physics. They are accessible via the following web addresses: [www.agaviation.org/elem.pdf](http://www.agaviation.org/elem.pdf) and [www.agaviation.org/seccur.pdf](http://www.agaviation.org/seccur.pdf).

## **Lesson Plans that Fly**

This resource consists of hands-on science kits for grades 3-6. It was developed by a team consisting of the FAA, the Vintage Flying Museum, and the Eagle Mountain – Saginaw Independent School District. Of interest is the fact that lesson plans have been correlated to the Texas Essential Knowledge and Skills standards.



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## National Coalition for Aviation Education (NCAE) ([www.aviationeducation.org](http://www.aviationeducation.org))

One of the most comprehensive, single sources is the NCAE which represents government, industry, and labor and supports educational initiatives at the local, state, and national levels. Members of NCAE are aviation-related groups, organizations and businesses who recognize the importance of aviation education. Education projects contribute toward an informed and interested public, which is a vital factor in the sustainability of all aviation activities.



Source: [www.aviationeducation.org](http://www.aviationeducation.org)

The coalition's website states the following about the organization:

*The National Coalition for Aviation Education is a membership organization that was formed in 1993 when the founding member groups signed a formal charter and established a partnership with the FAA. Together with the FAA, we actively promote aviation and space education while supporting schools' initiatives at the local, state and national levels.*

*The NCAE was formed in a cooperative spirit between the aviation industry and the FAA to present a united voice on aviation education issues. We work with aviation educators, government officials and industry representatives to marshal education resources and use aviation to train American's young people.*

*This web site was created as a one-stop clearinghouse for aviation education materials. You'll find gathered here a comprehensive list of information sources available from our member organizations. Whether you're an educator looking for teaching aides or a student seeking aviation career information, this is the single, most comprehensive resource available.*

The site offers information about teaching resources, aviation camps and scholarships. Its members represent a wide range of aviation and education stakeholders. The membership listed below includes hyperlinks to the NCAE webpage where additional information and individual webpage links for each of the organizations can be found.



Source: [www.aviationeducation.org](http://www.aviationeducation.org)



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## Members

### *Foundations*

[Aero Club Foundation of Washington](#)

[Air Force Association](#)  
[Careers in Aviation](#)  
[EAA Aviation Foundation](#)  
[Newspaper In Education Foundation](#)  
[Wolf Aviation Fund](#)

### *Government*

[4-H Aerospace Education Program](#)  
[Airmobile - Science Museum of Virginia](#)  
[Aviation Council of Pennsylvania](#)  
[Federal Aviation Administration](#)  
[National Aeronautics and Space Administration](#)  
[National Association of State Aviation Officials](#)  
[Naval Sea Cadets](#)  
[The U. S. Centennial of Flight Commission](#)  
[Virginia Department of Aviation](#)  
[West Chester University- Helicopter Museum](#)

### *Labor*

[Air Line Pilots Association, International](#)  
[International Association of Machinists and Aerospace Workers](#)

### *Pilot/Flight*

[Academy of Model Aeronautics](#)  
[Aircraft Owners & Pilots Association](#)  
[Be A Pilot](#)  
[Catavia Kids](#)  
[Civil Air Patrol](#)  
[Gary Air](#)  
[National Air & Space Museum](#)  
[National Association of Rocketry](#)  
[National Soaring Museum](#)

[Richard Klein, Aviation Education Alliance NFP](#)  
[Soaring Society of America](#)  
[The Ninety-Nines, Inc.](#)  
[U.S. Ultralight Association](#)  
[Women In Aviation, International](#)

### *Schools*

[Daniel Webster College](#)  
[Magnet Schools of America, Inc.](#)  
[University Aviation Association](#)

### *Trade Associations*

[Aerospace Industries Association](#)  
[AHS International - The Vertical Flight Society](#)  
[Air Traffic Control Association](#)  
[Air Transport Association](#)  
[Aircraft Electronics Association](#)  
[Airports Council Intl-North America](#)  
[American Association of Airport Executives](#)  
[American Institute of Aeronautics & Astronautics](#)  
[Apogee Books](#)  
[Aviation Distributors & Manufacturers Association](#)  
[General Aviation Manufacturers Association](#)  
[Helicopter Association International](#)  
[International Society of Aviation Maintenance Professionals](#)  
[Ken Cook Company](#)  
[National Aeronautic Association](#)  
[National Agricultural Aviation Association](#)  
[National Air Carrier Association](#)  
[National Air Transportation Association](#)  
[National Aircraft Resale Association](#)  
[National Business Aviation Association](#)  
[Professional Aviation Maintenance Association](#)  
[Regional Airline Association](#)



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Other useful and informative activities posted on the site are activities that take place throughout the year that would be of interest to students at all levels. This includes career fairs in the Dallas/Fort Worth area and the recently created fair at ABIA sponsored by the TxDOT, Flight Services. Other organizations, including the Organization of Black Airline Pilots, sponsor activities as well.



The following list provides additional resources, websites and events that may be of assistance to primary and secondary education teachers and counselors looking to provide assistance to students regarding career and educational opportunities in aviation.

- Women in Aviation, International  
[www.wai.org](http://www.wai.org)
- The Ninety-Nines, Inc., International Organization of Women Pilots  
[www.ninety-nines.org](http://www.ninety-nines.org)
- General Aviation Manufacturer's Association (GAMA)  
[www.gama.aero/files/2001\\_learning\\_to\\_fly\\_reduced\\_pdf\\_498c4c224a.pdf](http://www.gama.aero/files/2001_learning_to_fly_reduced_pdf_498c4c224a.pdf)
- NASA  
[www.nasa.gov/offices/education/about/index.html](http://www.nasa.gov/offices/education/about/index.html)
- 4-H Aerospace Education  
[www.aces.edu/dept/4Haero/](http://www.aces.edu/dept/4Haero/)
- Women in Aviation Resource Center  
[www.women-in-aviation.com/Education/](http://www.women-in-aviation.com/Education/)
- Careers in Aviation  
[www.careersinaviation.org](http://www.careersinaviation.org)
- DFW Career Expo  
[www.dfwcareerexpo.com](http://www.dfwcareerexpo.com)
- Barrington Irving (first African American and youngest person to circumvent the globe solo 3/23/2007 to 6/27/2007)  
[www.experienceaviation.org](http://www.experienceaviation.org)
- University Aviation Association  
[www.uaa.aero](http://www.uaa.aero)
- Organization of Black Airline Pilots  
[www.obap.org](http://www.obap.org)

## E. AVIATION EDUCATION AND OUTREACH DELIVERY MECHANISMS

Having established that significant resources are available to primary and secondary teachers and guidance counselors, the focus and challenge becomes delivering the aviation career message to students. Exhibit 6 illustrates the primary opportunities and mechanisms that exist today for reaching out to primary and secondary school students to expose them to aviation, capture their interest, and show them existing careers that are rewarding and exciting.



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## Exhibit 6: Aviation Education Outreach Delivery Model



Source: Aviation Education Team

### Dual Credit Programs

Dual credit programs allow high school students to enroll in college classes and simultaneously earn credit towards both high school and college requirements. These classes can be held on a college campus, but are most often held on a high school campus. Dual credit courses include academic and technical/workforce classes and serve as a path towards a college degree or as college-level workforce education.

According to the THECB, since 1999, the number of students in Texas enrolled in dual credit courses has increased steadily from 11,921 to 64,910 in 2007. THECB notes that the advantages of such programs include the following:

- Increases the likelihood a student will complete high school and enroll in college;
- Decreases cost of tuition and fees by decreasing time spent in college;
- Frees up space for additional students;
- Benefits new graduates because they enter the workforce earlier; and
- Contributes to Texas' academic success.



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In 2006, the Texas lawmakers enacted legislation requiring all school districts to implement a program by fall 2008, that would allow students to earn the equivalent of 12 college credits while in high school. The dual credit program is one of the vehicles that allows for this to occur. So while school districts are not required to offer dual credit programs, doing so helps to meet this requirement in addition to the other benefits noted above.

High schools that participate in dual credit programs are eligible to receive state funding based on average daily attendance. Colleges are eligible for state funding according to state formulas. Decisions are made at the local level regarding who pays for tuition, fees, and other associated costs. There are cases where the school districts pay the costs and others where the parents pay the costs. Public institutions of higher education are allowed, by state law, to waive all or part of the costs associated with dual credit courses. In most cases, the cost of providing textbooks falls to the students and their parents.

Texas law requires that the state's institutions of higher education provide assistance to school districts in developing and implementing a dual credit program should they request the help. The law allows for school districts and colleges to collaborate in efforts that support the program in the areas of teaching, scholarships, transfer agreements, course design, instructor training and testing.

THECB outlines the course requirements for those offered under the dual credit program. They must be identified as college level academic courses in the current edition of the *Lower Division Course Guide Manual* adopted by THECB or as college level workforce education courses in the current *Workforce Education Course Manual* adopted by THECB. THECB also provides guidance on the eligibility requirements for students wanting to enroll in dual credit programs.

## **Career and Technical Education Programs (CTE)**

CTE programs are designed to assist students in preparing for their lives beyond high school. As such, the state has adopted the national model of the 16 Career Clusters on which to focus career and technical education programs in the secondary schools. These clusters are:

- Agriculture, Food and Natural Resources;
- Architecture and Construction;
- Arts, A/V Technology and Communication;
- Business, Management and Administration;
- Education and Training;
- Finance;
- Government and Public Administration;
- Health Science;
- Hospitality and Tourism;
- Human Services;
- Information Technology;
- Public safety, Corrections and Security;
- Manufacturing;
- Marketing;
- Science, Technology, Engineering and Mathematics; and



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- Transportation Distribution and Logistics.

CTE programs are provided in high schools across the state. They center on educational opportunities for jobs that are high in skill, demand and wages. These programs are established to ensure that high school students are focused on college and career opportunities. As with academic courses, CTE courses can be offered as dual credit courses with students earning college credit.

CTE programs also offer students the opportunities to earn various industry certifications. Examples include the Microsoft Certified Application Specialist, Certified Veterinary Assistant and National Automotive Technician Education Foundation Certification designations.

Texas' new CTE program is called *Achieve Texas* ([www.achievetexas.org](http://www.achievetexas.org)). As noted on its website, *Achieve Texas* is an "education initiative designed to prepare students for a lifetime of success. It allows students to achieve excellence by preparing them for secondary and postsecondary opportunities, career preparation and advancement, meaningful work, and active citizenship."

In an effort to provide a clear picture of what the *Achieve Texas* program is set up to accomplish, the program's goals as outlined on the website are included below. The goals are:



- Career Clusters and Programs of Study (POS) are an integral part of the Texas education system.
- Every student prepares a personalized graduation plan in middle school to plan for grades 9–16 and beyond. The student chooses a Career Cluster and POS to guide his or her learning in the context of personal career interests. Plans are evaluated and updated annually.
- Clusters span all grades (P–16+). Career awareness begins in elementary school and transitions into career exploration in middle school. Career concentrations in high school help students transition into career preparation at the postsecondary level. All participants experience career advancement in employment.
- The education system is seamless between high school and postsecondary institutions. Students have opportunities in a POS to earn dual credit and articulated credit that flows seamlessly into postsecondary education or training.
- Partnerships are in place throughout the system. Partnerships are established statewide and locally between business and education. Educational institutions form meaningful partnerships.
- Academics are woven throughout the P–16+ curriculum. There is an integration of academic and technical knowledge and skills within the curriculum. Interdisciplinary teaching takes place and academics are taught in context. Curriculum alignment occurs between secondary and postsecondary education.
- Career guidance is dramatically enhanced. All students have access to quality assessment and career information resources. Career counseling is provided with a strong emphasis on career and college readiness.



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- All students take part in extended learning opportunities. Every student chooses extended experiences such as service learning, internships, apprenticeships, and work-based learning.
- Professional development supports the cluster system and is a critical part of the teacher's career. Schools of education train teachers for career clusters.

The program utilizes these 16 clusters as the basis for structuring the program with each cluster containing specific programs of study. The cluster most relevant and of interest to aviation is the Transportation Distribution and Logistics cluster. Within this cluster there are seven programs of study, each of which reflects a specific occupation and contains specific core courses and electives that help prepare students to succeed.

The seven programs of study are:

- Facility and Mobile Equipment Maintenance;
- Health, Safety, and Environmental Management;
- Logistics Planning and Management Services;
- Sales and Service;
- Transportation Operations;
- Transportation Systems/Infrastructure Planning, Management and Regulation; and
- Warehousing and Distribution Center Operations.

Three specific areas noted within these concentrations of study are aviation maintenance, airline pilot and urban and regional planner. Each has a specific relevance or connection to aviation occupations that are listed in program of study material. Furthermore, a specific program of study exists that identifies the courses that should be taken while in high school. It also shows the certifications that can be earned and the related post-secondary opportunities that are available for students interested in the topic area. Also included is a listing of specific occupational titles. This specific information can be found on the transportation section of the *Achieve Texas* website ([www.achievetexas.org/Transportation.htm](http://www.achievetexas.org/Transportation.htm)) and should be consulted by those wishing to establish such a program.

## **Magnet Schools in Texas**

A magnet school is a public school, primary or secondary, that offers specialized or focused courses and/or curriculums. The term "magnet" refers to the ability to draw in or attract students who have specific interests, talents or backgrounds in specialized areas of study. The FAA, through its bi-annual survey of aviation magnet programs, notes that there is continuing growth in the number of aviation magnet schools across the country. Texas is home to five aviation magnet schools.

Of the five programs in Texas, three are high schools, one is a junior high school and one is an elementary school. They are:

- Skyline High School, Dallas, TX
- Hays Magnet Elementary School, Odessa, TX
- Hirschi Math-Science Magnet, Wichita Falls, TX
- Kirby Junior High School Wichita Falls, TX, and



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- Sterling High School, Houston, TX.

An aviation magnet school offers an opportunity to attract highly interested and capable students and place them in a program that nurtures skill and interest. It is a path that establishes them on a fast track for post-secondary opportunities and one that will ultimately put them in the workforce at an exceptional level. The breadth and depth of the aviation programs at magnets schools varies but all are focused on providing specialized education at a point earlier in the process than typically encountered.

Since magnet schools are typically public, it is expected that program costs are borne by the school and/or district. While public/private partnerships may exist to provide some of this support, it is likely that little or none of the cost is absorbed by the students and their parents as many would be unable to pay the high fees associated with those that have flight components. In the past, some schools in the country, and in Texas, have been successful in paying for programs through the Magnet Schools Assistance Program (MSAP) in the ED ([www.ed.gov/programs/magnet/index.html](http://www.ed.gov/programs/magnet/index.html)) which funds “the elimination, reduction, and prevention of minority group isolation in elementary and secondary schools with substantial numbers of minority group students.”



Those pursuing or considering establishing an aviation magnet program should consult other magnet schools and pursue resources through the FAA and ED. The FAA has published the *Curriculum Guide for Aviation Magnet School Programs* that could be a valuable resource today for those implementing any type of aviation education programs for primary and secondary students. Magnet programs have the ability to cultivate a student’s interest in any profession. The aviation industry, public and private, should make appropriate use of them in their efforts to train and employ the next generation.

The Dallas Skyline aircraft mechanics program was certified in 1972 to provide training to high school students. This training not only allows them to qualify for the FAA Airframe & Powerplant (A&P) exams, but it also allows them to begin a career in aviation maintenance early in their educational process.

While not a magnet program, DeSoto High School offers a flight program to students. This program began with 20 students who begin classes five weeks early and continue with one hour of classwork per week. They also meet every other Saturday on location at Dallas Executive Airport. The students work up to their first solo flight before the course concludes. The flight training program, which costs \$63,000, is funded by the district and was selected over a mechanical program because of the cost of the latter.

In DeSoto, students are also encouraged early to join a Reserve or Junior Reserve Officers' Training Corps (ROTC/JROTC) program as it can expose them to educational and career aviation opportunities.



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Another high school aviation program of note is Dunbar High School in Fort Worth, named after the distinguished African American poet/writer Paul Laurence Dunbar. Among his legacies was his encouragement for students to pursue careers previously closed to African Americans. Dunbar is home to an aviation program that offers opportunities to students in aviation maintenance as well as in flight. Recent enrollment numbers indicate that the program has seven students in the flight training program and 10 in the aviation maintenance program. It is associated with CRP Future Pilots Flight School.

Examples of aviation professionals being involved with students are many. One of these of note is an “informal” internship out of a plane hangar at Pecan Plantation in Johnson County. The Dennis Polen Education Foundation was founded in 2003 by Richard Keyt.

Students learn practical and technical skills during the internship. The program’s curriculum includes aircraft/aerodynamic design, engineering, manufacturing, project management, maintenance, piloting and career development. Additional information can be found on the foundation’s website at [www.polen-co.com/education\\_foundation.htm](http://www.polen-co.com/education_foundation.htm).

## Science, Technology, Engineering and Math Programs

In late 2005, the state of Texas launched a new initiative aimed at making the state more economically competitive in attracting companies from the technology sector. These economic development efforts have become highly dependent on the state having a workforce with greater scientific and technological expertise. The initiative, and how it interacts with other programs and state goals, is outlined on the TSTEM website which can be found at [http://ritter.tea.state.tx.us/ed\\_init/thsp/tstem/index.html](http://ritter.tea.state.tx.us/ed_init/thsp/tstem/index.html).

As noted on the website, the goals of the TSTEM program are:

- To develop the nation’s leading innovation economy workforce by aligning high school, postsecondary education, and economic development activities;
- To establish 35 Texas Science, Technology, Engineering, and Math Academies in areas of high need across the state, each year producing 3,500 Texas high school graduates from diverse backgrounds, with the preparation to pursue study and careers in science, technology, engineering, and math related fields;
- To create five to six Texas Science, Technology, Engineering, and Math Centers across the state that will support the transformation of teaching methods, teacher preparation, and instruction in the science, technology, engineering and math fields; and
- To establish a statewide best practices network for science, technology, engineering and math education to promote broad dissemination and adoption of promising practices from the initiative and to improve math and science performance for students across Texas.

Opportunities exist within this structure to offer aviation-related instruction that could foster interest and expose students to educational and career opportunities in aviation. The Coppell Independent School District has a School of Engineering designed to expose students to engineering professions and help prepare them to be successful in the field after high school. While this is a large-scale example of preparing students, the TSTEM Initiative, through its *Best Practices Network*, can assist interested schools and districts in a variety of topic areas



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including professional development, math and science curriculums, lesson plans, real-world activities in math and science and expert advice.

## Integration of Existing Aviation Material into Class Curriculum

A less rigorous method of infusing aviation-related topics into the classroom is through the use of existing curriculum guides, many of which are listed in Appendix B. This provides a less formal mechanism for offering aviation lessons. They are also available for virtually every grade level from kindergarten through the 12<sup>th</sup> grade.

This method allows teachers to pick and choose the modules or lessons that are appropriate for the existing course. It provides aviation examples and learning opportunities that expose students to aviation in the process.

## After School Programs

After school programs include those sponsored by the school or district and those that simply take place after school, either on or off school property. Both offer opportunities to reach out to young students.

Opportunities exist for schools to develop sponsored programs or clubs that focus on aviation and aerospace educational opportunities. Much like school athletics, debate clubs, student government and other school-sanctioned activities, these programs are focused on exposing students to educational and career opportunities in the aviation industry. Lessons, activities and field visits can be valuable in this regard, and school coordinators have at their disposal a myriad of material developed by the FAA, industry groups mentioned earlier, and others. Such an after school program offers public-private opportunities for industry to work together with the school districts.

The second type of after school program often takes place at the school but is operated by a private or non-profit organization. Examples of these are the *Kid's Klub* and *Champions* programs available in elementary and middle schools. While the primary focus of these programs is to provide an enriching environment for students whose parents work in the afternoon, there exists opportunities to integrate aviation activities and lessons into the program. Age-related activities are available in the materials mentioned that would more than adequately serve this purpose. Many of the pertinent and available activities, such as model rocketry, are easy to organize and can often create excitement and interest in aviation among youth. Often only a spark is needed to set off a young student's curiosity and interest that can lead him or her down an aviation-filled path. Additionally, these types of after school programs can take place off campus and be sponsored by third party organizations. The same types of activities can take place in these environments as well.



Source: [www.discoverchampions.com](http://www.discoverchampions.com)



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Only interest and desire are needed to establish this type of outreach effort. The materials and activities readily exist and can be easily integrated into a new organization or the existing activities of typical after school programs.

## Extracurricular Activities and Programs

In addition to the aviation outreach methods that take place in the schools, a variety of programs and opportunities exist to demonstrate the many facets of aviation to primary and secondary school children. These are, for the most part, widely known, but underutilized. Five of the most prominent aviation-related extracurricular activities are:

- ACE Academies;
- Civil Air Patrol;
- Summer institutes/camps;
- Career expos; and
- Community events.

ACE Academies, co-sponsored by the FAA with third-party aviation organizations, are summer programs that expose middle and high school students to aviation career opportunities. Texas is home to a few ACE Academies every year but the existing aviation assets and resources in North Central Texas, in conjunction with the significant numbers of secondary students, indicate that additional opportunities exist. More information on ACE Academies which are discussed earlier in this report, can be found on the FAA website at [www.faa.gov/education/student\\_resources/ace\\_camps/](http://www.faa.gov/education/student_resources/ace_camps/).

The Civil Air Patrol, also discussed earlier, is a cohesive organization in which students and adults can become involved and learn about career opportunities. Students in the schools should be made aware of the organization and given direction to learning more about what they offer and how they can benefit from all of their programs, not just the aerospace education mission.

There exists some opportunity for students to participate in summer institutes or camps where they are immersed in all-day activities. Students participate in all activities together and sleep, in some cases, in the dormitories on a university or college campus. TTI, in conjunction with the SWUTC and colleges and universities across the state, offer such a program every summer. In addition, other organizations, such as EAA, offer aviation camps in which students can participate. While no single database of camps exists, the entities mentioned above can be consulted by prospective attendees or by other organizations, higher education, industry or otherwise, that may seek to establish and fund a regularly occurring institute or camp to accommodate the interest of students and further develop a pipeline for educational and workforce pathways. Such programs are time-intensive and require some level of funding, although creative partnerships may help offset costs.

The Texas Summer Institute program is a good model of such partnership. It is supported, in part, by the Federal Highway Administration. Additional information on this program can be found at [www.fhwa.dot.gov/civilrights/nsti.htm](http://www.fhwa.dot.gov/civilrights/nsti.htm). These programs are designed to “provide career orientation and educational experiences to motivate secondary school students toward professions in the field of transportation.” At a minimum, aviation components can be



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implemented into such programs, thus reaching a broader group of students and potentially attracting them to a career in aviation.

Career Expos have become a desirable way of communicating to students the career and educational possibilities that await them. One of the largest of these events, the DFW Aviation and Transportation Career Expo takes place at the Dallas/Fort Worth International Airport (DFW) and is now in its sixth year. It draws thousands of students as well as the major public and private aviation entities in the region. It is intended for elementary through high school students who have an opportunity to meet with government, education, and industry personnel to discuss the multitude of career paths in aviation. Additional information on this event can be found at [www.dfwcareerexpo.com](http://www.dfwcareerexpo.com).



On occasion, career events are hosted or co-hosted by local Chambers of Commerce and Economic Development Corporations who are stakeholders and obvious partners for developing innovative and successful workforce links between educational institutions and industry employers.

An event at a local airport is always an opportunity to draw attention to aviation and the opportunities it presents. Airports often host air shows, fly-ins and other events designed to reach out to the community and showcase its facilities and the benefits they provide to their neighbors. In the process, young students have an opportunity to see aviation at work, including its many uses and benefits and the technology that it employs. These events, due to the public focus on the glamorous side of the business, create interest and attract followers. The aviation community should continue to hold such events, publicize them adequately and capitalize appropriately on the attention they create by reaching out to the students and conveying to them the opportunities that exist for them, both in and out of the school setting. This includes information about career paths and the exciting industry that they can one day be a part of.

## **Additional Considerations for Outreach**

Aside from the program and opportunities noted above, consideration should be given to four additional aviation education outreach efforts. They are not included above as they are not necessarily part of the direct educational (aviation) delivery process but are ancillary to them. Yet, they can play an important part in that delivery.

The first is the role and involvement of guidance counselors. Including these important individuals can be critical in getting the right information into the right hands. It is important that industry and educational institutions work to develop a mechanism to disseminate information and update guidance counselors in the region about aviation career opportunities, events, career expos, and other important activities. This is a crucial link between secondary students and higher education and the industry workforce.

Second, districts and schools should give consideration to establishing ROTC and/or JROTC programs. Although these are not solely aviation programs, they can include some aviation components and lead students toward careers in aviation, flight or maintenance/avionics related.



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The third consideration takes advantage of the large number of aviation-related museums in the state and region. Many of these are hidden gems that are staffed with knowledgeable employees and volunteers who relish the opportunity to work with students. Consideration should be given to including them in aviation activities, utilizing their resources in programs/curriculums, and developing partnerships to create a rich learning environment for the students. Exhibit 7 shows a list of the cultural and historical resources in the state and region.

## Exhibit 7: Cultural and Historical Resources: Museums in the Region

North Central Texas	
<a href="#">American Airlines, C R Smith Museum</a>	Fort Worth
<a href="#">British Flying Training School Museum</a>	Terrell
<a href="#">Cavanaugh Flight Museum</a>	Dallas
<a href="#">Cold War Air Museum</a>	Lancaster
<a href="#">Frontiers of Flight Museum</a>	Dallas
<a href="#">Hangar 10 Flying Museum</a>	Denton
<a href="#">Vintage Flying Museum</a>	Fort Worth
Texas	
<a href="#">1940 Air Terminal Museum</a>	Houston
<a href="#">American Airpower Heritage Museum</a>	Midland
Aviation Museum of Texas	Kerrville
Brooks Heritage Foundation	Brooks City-Base
Corpus Christi Museum of Science & Industry	Corpus Christi
Dyess AFB Linear Air Park	Abilene
<a href="#">Flight of the Phoenix Museum</a>	Gilmer
<a href="#">Hangar 25 Air Museum</a>	Big Spring
<a href="#">Historic Aviation Memorial Museum</a>	Tyler
<a href="#">Lone Star Flight Museum</a>	Galveston
<a href="#">National Museum of the Pacific War</a>	Fredericksburg
<a href="#">Pioneer Flight Museum</a>	Kingsbury
<a href="#">Silent Wings Museum</a>	Lubbock
<a href="#">Texas Air Museum</a>	Caprock
<a href="#">Texas Air Museum</a>	San Antonio
<a href="#">USS Lexington Museum</a>	Corpus Christi

Source: <http://aerofiles.com/museums.html>

A fourth recommendation is to encourage a college or university to offer teacher academies that demonstrate how to implement aviation components into their existing curriculums while exposing them to aviation opportunities. The hope would be that the teachers would then pass on to their students their experiences. This could prove to be a critical link in the aviation workforce pipeline.



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## F. SUMMARY AND RECOMMENDATIONS FOR PRIMARY AND SECONDARY SCHOOLS

Reaching out to primary and secondary students is paramount for the aviation industry because its future relies on generating interest in its professions beginning at an early age. It is incumbent upon the industry and the educational system—across all levels—to reach out to youth of all ages, generate interest and provide opportunities.

This report provides insight into the resources and materials that are available for primary and secondary school students, including aviation curriculums for a multitude of grade levels as well as classroom activities and lesson plans/modules that can be incorporated into existing curriculums in a variety of courses. In addition, a number of additional outreach programs and mechanisms such as dual credit programs, magnet schools, STEM curriculums and after school activities are extremely important. There is no shortage of materials or delivery mechanisms. Rather, a concerted effort to build on existing programs in the region while coordinating and promoting their existence and importance is needed.

Throughout the region, there are schools that have embarked on programs to facilitate student interest in technical fields including aviation by offering some course or program in a science, engineering and/or technical field. These are good beginnings to a more fully developed aviation program that serves as a catalyst for launching aviation careers and developing a pipeline for both higher education and industry.

The following are consolidated recommendations regarding public involvement and outreach programs for the primary and secondary levels that are based on the information presented in this report:

- Work to integrate existing programs discussed in the report into the overall regional aviation education system.
- Develop the existing programs further to become key elements in the system in terms of providing adequate courses and a suitable pipeline of students for the next level.
- Establish teacher workshops and summer programs to provide a farther reach.
- Publicize community airport events/air shows in the primary and secondary schools.
- Encourage wider attendance of the DFW Career Expo among area schools—teachers and students.
- Market, direct and develop relationships with primary and secondary institutions through career guidance counselors, career/technical education programs, career expos, or other programs.
- Work with Career Technology Educators of North Texas and the Texas School Counselor Association, as well as networks for daycare operators.
- Work with NBAA and AOPA regional representatives to implement programs. Make them active partners as they are beneficiaries as well.
- Have NASAO push for federal funding of aviation education initiatives.
- Encourage FAA to fund additional ACE Academies/programs.
- Establish partnerships with state aviation departments in providing educational resources and funding.
- Encourage two-year schools to develop dual-credit aviation programs.



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- Work with after school programs to integrate aviation curriculum activities into their programs.
- Increase aviation-related holdings in school libraries.

In conclusion, the recommendations in this report are focused on activities that serve to engage elementary and secondary school students in the aviation field as soon as possible. However, it is imperative that virtually all of the components of the comprehensive outreach plan which conclude this study are implemented simultaneously, with a high degree of energy and enthusiasm. In this way, the goal of creating an integrated aviation education program in North Central Texas can most assuredly be accomplished.