

Introduction

This report fulfills a federal grant funded by the Carl D. Perkins Vocational and Technical Education Act of 1998 and funded through the Florida State Department of Education (FLDOE). The purpose of the grant was to provide a K-20 review of Aviation and Aerospace career cluster curricular frameworks. A curricular framework is the educational foundation and provides the purpose, equipment, and tools used in the curriculum. Each framework also contains the intended learning outcomes and specific performance standards for students, categorized by the industry's occupational completion points (OCP) with specific job titles associated with each completion point. Finally, the frameworks give additional information such as instructor qualifications and websites for extra resource materials or distance learning courses. Specific educational programs' (for example, the Aviation Operations degree) curricula are developed from these frameworks and educational institutions are paid based on student participation in these programs. This grant required a review of the following seven designated Florida programs/frameworks: the **Aerospace Engineering** program at the college and university level (there are currently no frameworks established at the 4-year college level), the **Aerospace Technology** and **Aviation Operations** frameworks at the community college level, the **Air Traffic Control**, **Aircraft Airframe Mechanics**, and **Avionics** frameworks at the postsecondary vocational level, and finally the **Aerospace Technologies** framework at the secondary level. The consortium also chose to review the **Professional Pilot** and **Aviation Maintenance Management** frameworks used by community colleges. The grant required a consortium of industry and educational partners to identify gaps between industry standards and the capacity of Florida's workforce education programs to meet these industry requirements. The grant also required the consortium to address how the project supports "Just Read, Florida" and implements or enhances the President's Initiatives for secondary and technical education. Finally, the grant required the consortium to address how this project will be disseminated and marketed to secondary and postsecondary workforce educational students.

This report will be divided into eight parts. The **first section** will include a general review of the US education system and information obtained from industry interviews accomplished throughout Florida. The **second section** will provide updated frameworks with a summary of the specific changes made to the current frameworks found on the FLDOE website. The **third section** will cover recommendations that foster a seamless articulation for students from one educational level to the next without requiring remediation for the same competencies taught at an earlier level. The **fourth section** includes recommended websites with abstracts that provide resources for teachers of the designated programs. The **fifth section** provides recommendations that comply with the President's Initiatives, the Florida Sunshine State Standards, and the "Just Read, Florida" programs. The **sixth section** suggests ways to market and distribute the project recommendations, whereas the **seventh section** provides miscellaneous recommendations that do not fit into the first six areas. The **final section** contains career information about each type of occupation (for example, Aircraft Pilot or Mechanic) which can be copied to a compact disk and distributed to middle and high school career counselors so they can

advise students about the requirements and opportunities available in the aviation/aerospace career cluster.

For the purpose of this report, the term “aviation” pertains to educational programs and industry occupations that prepare a student for jobs that involve working on, around, in or with civilian and military aircraft. The term “aerospace” pertains to occupations that involve working on, around, or with space vehicles such as civilian and military missiles or spacecraft.

The consortium members who worked on this grant by organization and name are:

Boeing Company: Dale Simms
Brevard Community College: Dr. Al Koller
Capital Avionics: Al Ingle
Duval County Public Schools: Louis Simmons
Embry-Riddle Aeronautical University: Dr. Ken Stackpoole and John Faust
Florida Aviation Aerospace Alliance: Marshall Heard
Florida Community College at Jacksonville: J.B. Renninger and Rich Rozanski
Florida International University: Dr. Cesar Levy
Frank H. Peterson Academies of Technology: Victor Morris
George T. Baker Aviation School: Ruby Jones
The Florida Space Research Institute: Tom Cavanagh
The Florida State University: Tommy Bowermeister, Tom McGurk, Dr. Mae Waters, and Judy Barrett-Elmer

These education and industry members bring over 450 cumulative years of experience with aviation and aerospace issues and are well qualified to provide the following information and recommendations.

The process used for this grant was multifaceted. First, the consortium met to determine specific goals and objectives to accomplish the grant deliverables. A website, <http://fcpr.fsu.edu/flaccc>, was developed by The Florida State University Institute of Science and Public Affairs to enable consortium members to have interactive discussions as well as share files and ideas. This website also enabled educational institutions to enter academic program data such as student knowledge, skills, and tools used during the educational program. Finally, the website allowed industry representatives to enter occupational education levels with knowledge, skills, and tool requirements for each job. In addition to gathering data through the website, consortium members visited aviation and aerospace industries throughout Florida to interview them and obtain first-hand information about specific gaps they believe exist between what entry-level employees know and what the industry has to train these employees to do. Each of the curriculum frameworks was evaluated by the industries and where applicable, they recommended changes to the major concepts, intended outcomes, and student performance standards. Other anecdotal information was obtained regarding seamless progressions from entry-level to top-level positions and how education assists or needs to assist with that progression. Interviews were also performed with Florida and other state educational

institutions to determine if framework changes were required as a result of industry inputs to these institutions. One final consortium meeting enabled members to develop draft recommendations and identify actions required by the consortium members to produce the final grant report.

Section One

A General Review of the US Educational System.

Florida has an enviable aviation and aerospace educational environment. The Kennedy Space Center; 17 middle and high schools and 16 community colleges and universities teaching aviation and/or aerospace subjects; several joint flying and space military bases; and the nation's largest student pilot population are just a few reasons why the aviation and aerospace industries are the second largest segment of Florida's economy. However, before the consortium reviewed the Florida educational system to determine if there were gaps that precluded a seamless articulation between current programs and employment, a need to review the national education system was required to ensure there are not national trends that might create gaps within the Florida educational system.

In the last century, the US education system facilitated the development of history's greatest economic and military power, and that same system continues to provide adequate human resources for today's service and technology needs. Troubling signs, however, indicate that additional education reforms are required if the US plans to retain its competitive edge in this century. The US, like many nations, abounds with imaginative opportunities for education and training, but access to these opportunities remains uneven and is too often tied to the distribution of wealth. Human skills and talents are defined as an element of our national power that we must safeguard by improving the overall quality of all three sectors of our educational system.¹ These three distinct sectors are: the **traditional** sector, consisting of the kindergarten through grade twelve (K-12) schools and higher education institutions. This sector has many concerns and faces significant challenges that will be discussed further in this section. The **transitional** or 'school-to-work' sector is characterized by vocational and technical training that occurs outside of the traditional school environment. Two excellent examples of such institutions that provide this type of training are the George T. Baker Aviation School located in Miami, Florida and the US military. Both of these organizations provide the opportunity for students to acquire a skill, which allows immediate employment upon completion of specific education and training, as well as the potential to reenter the traditional postsecondary education sector after three or four years in most cases. The final sector is **employer-sponsored** education and training. Today, this sector is the fastest-growing of all three sectors. Companies are currently spending \$60 billion on education and training.² Employer-sponsored training includes a wide variety of programs, such as training for line employees to acquire and improve basic administrative skills, advanced technical training for the white-collar workforce, as well as advanced leadership and management schooling for current and future senior corporate leadership. Not only does training improve worker productivity, but it also increases morale, which motivates and often obligates employees to stay with the company. With a predicted skilled labor shortfall of over ten million by 2020, companies are increasingly using education and training to retain their skilled workforce in the market. And since

¹ Investment in Education: Private and Public Returns.

² Jake Bowsher, Fix Schools First (Gaithersburg, MD: Aspen Publishers, 2001), p. 11.

today's children will be our future leaders and skilled workforce, they deserve the best education we can give them. Unfortunately, there are many concerns and challenges in the traditional sector that need enduring solutions.

Recent studies indicate, “teaching quality is the single most important factor influencing student achievement, moving students well beyond family background limitations.”³ However, a number of factors, including the prospect of increasing enrollments and a rapidly aging teacher population, fuel the growing need for recruiting teachers. The high numbers of teachers leaving the profession due to low pay and poor working conditions compound these factors.⁴ The US faces a major teacher shortage, especially in large urban school districts, and particularly in the fields of bilingual and special education.

High poverty urban school districts face the additional challenge of boosting not only teacher numbers but also teacher quality. Studies show a direct correlation between students taught by the most qualified and effective teachers and students’ achievement. The main reason behind the teacher shortage problem is low teacher retention. Approximately 15 percent of new teachers do not return for a second year of teaching. The attrition rises to nearly 35 percent after three years of teaching and over 45 percent after five years of teaching.⁵ Other statistics show that 60 percent of teachers who have entered the profession through the alternative certification route leave the profession within three years.⁶ One of the main reasons behind low retention is low salaries. In 2001, the average teacher salary was \$43,250; however, 36 states had averages below this with the lowest being just \$30,265.⁷ With low salaries and challenging discipline problems in the classrooms, most teachers find they could make a better salary, have more job satisfaction, and better provide for their families by taking a job outside the teaching profession. Many teachers believe that a better system of pay should be implemented to include such things as performance, additional duty, and incentive pays. Since low pay is a significant issue, especially for those leaving high poverty urban schools, states should examine how they can make pay more equitable for these schools as they distribute state dollars to the school districts. Without better pay, teacher attrition will continue to be a concern in the traditional sector. And the effect of such attrition on children’s development has been well documented. Studies have shown that students learn best from experienced teachers, and too many teachers are not staying long enough to be considered experienced.⁸ Statistics at the fourth grade, for example, reflect that while 63

³ Leslie S. Kaplan, “The Politics of Teacher Quality: Implications for Principals,” National Association of Secondary School Principals (NASPP) Bulletin 86 (December 2002).

⁴ National Commission on Teaching and America’s Future, No Dream Denied – A Pledge to America’s Children (Washington, DC, January 2003), p. 26

⁵ National Commission on Teaching and America’s Future, p. 26.

⁶ Linda Darling-Hammond, Solving the Dilemmas of Teacher Supply, Demand, and Standards: How We Can Ensure a Competent, Caring, and Qualified Teacher for Every Child (New York: National Commission on Teaching & America’s Future, [2000]), p. 17.

⁷ National Commission on Teaching and America’s Future, p. 134.

⁸ Patrick J. Kiger, “Blue Valley’s Lessons in Retention,” Workforce 81 (September 2002): 64-68.

percent of students are reading at or above grade level, 37 percent are not.⁹ Most troubling is that research indicates that students who fail to read at grade level by the fourth grade are the most likely to be left behind in academic performance. After the fourth grade, students should be reading to learn, rather than learning to read.

In addition to the current trend of fourth graders reading below grade level, sub-standard grade-level performance continues through high school. A significant number of high school students are not performing well in mathematics and science. Approximately 35 percent of twelfth graders score below grade level in mathematics, and 47 percent score below grade level in science. This is a critical issue in the new high-tech economy because 80 percent of all jobs now require some technical training or postsecondary education. In the aviation and aerospace businesses that were interviewed for this project, every one required some type of postsecondary education for entry-level employment. This is of major concern in Florida since the 2002 Chamber of Commerce Cornerstone Report stated that only 64 percent of freshmen completed high school in four years. This is one of the reasons why forecasters project a potential skilled labor shortage of over 10 million by the year 2020.¹⁰ Another concern with traditional higher education is that in Florida over 30 percent of college freshmen now take a remedial math course and over 20 percent take a remedial English course.

There are numerous possible causes for the above concerns in the US education system, such as teacher retention or classroom discipline problems. However, the most commonly mentioned cause that has shown a direct correlation to student performance is whether the student is living in low or high poverty. While there are some students who rise above their economically disadvantaged backgrounds and succeed in college, high poverty represents a significant challenge to academic success.¹¹

According to the analyses of the National Assessment of Educational Progress (NAEP) report data in 2000, fourth graders in high poverty schools had disturbingly lower achievement scores in mathematics than their peers in low poverty schools. The average score of students in high poverty schools was in the bottom third overall. In contrast, the average score of students in low poverty schools was in the top third of the scores.

In January 2002, President Bush signed No Child Left Behind (NCLB) into law. This new law represents the most sweeping changes to the *Elementary and Secondary Education Act (ESEA)* since it was created in 1965. One of the key goals of NCLB is to provide greater access for all children to receive a quality education regardless of income or background—since more than one-third of all fourth graders cannot read at the fourth grade level. Justification for NCLB is supported by the statistic that 68% of those who

⁹ “Many Current Graduates Unprepared for Career, Higher Education Success,” Utility Business Education Coalition, accessed 2 June 2004; available from <http://www.ubec.org/new.html>; Internet.

¹⁰ “Many Current Graduates Unprepared for Career, Higher Education Success.”

¹¹ Department of Education, “America’s Annual Progress Report on Education Provides Mixed Results,” Press Release, 31 May 2002, accessed on 2 June 2004; available from <http://www.ed.gov/PressReleases/05-2002/05312002.html>; Internet.

cannot read at their grade level are minority children who live in high poverty.¹² NCLB is an effort to produce a better educational system by connecting federal funding to performance, but has left it to the states to determine the standards to be used for measuring success. The greatest challenge, however, to implementing NCLB is a lack of adequate funding to meet all of the mandated requirements. Many states are facing budget crises, and additional funding requirements for the development, administration and reporting of new standardized tests, in addition to providing remedial programs for under-performing children, are enormous tasks under current fiscal conditions.

There is little doubt that the most significant influence on the elementary and secondary education industry in the near term will be the NCLB law. The goal of NCLB is admirable—to bring all racial, ethnic, economic and other groups up to proficient levels of performance within twelve years. The road ahead, however, will not be an easy one for the implementation of NCLB. Two possible problematic areas for states and local school districts will be demonstrating ‘adequate yearly progress’ (AYP) for each student and funding the new mandates. The AYP is based on a state’s own established standards and the current and previous yearly assessment test results. NCLB is forcing state and local governments to realign their education funding priorities to meet federal performance requirements. Consequently, state and local governments may struggle to fund all public school requirements, amidst budget cuts and increased costly federal mandates. Funding for the education system will remain a significant challenge for all sectors of the educational industry for a long time to come.

Too often, however, the citizen of today lacks the proper level of education required to replace America’s aging technically skilled workforce. Therefore, attendance at community colleges is expected to increase as more non-traditional individuals return to the educational system to seek opportunities to further their job skills or acquire new ones. Challenges in the higher education market include projections that show an increase in enrollments as well as degrees conferred at both two-year institutions (community colleges) and four-year institutions. According to the National Center for Educational Statistics, enrollment in public two-year institutions will increase by more than 10 percent between the years 2000 and 2012, and in private two-year institutions by 20 percent, or 650,000 more students. Enrollments in public four-year institutions will increase by 19 percent and in private four-year institutions by more than 15 percent, for 1.6 million more students during the same time frame.¹³ Accordingly, degree conferral will also increase. Associate’s degrees are projected to increase by almost 20 percent (approximately 104,000 degrees) between the years 2000 and 2012. Bachelor’s degree conferrals are projected to increase by 16 percent (approximately 200,000 degrees).¹⁴

To provide some budgetary relief, institutions of higher education are moving towards a more business-like model in their operations. For example, more dormitories and dining facilities have become privatized. Information technology (IT) will

¹² Department of Education, “No Child Left Behind-What to know and Where to Go,” April 2002, p. 10.

¹³ Debra E. Gerald and William J. Hussar, National Center for Educational Statistics, “Projections of Education Statistics to 2012,” U.S. Department of Education, October 2002, p. 26.

¹⁴ Gerald, Hussar, p. 63.

increasingly be relied upon to support the education process through online testing and online or hybrid courses that use shorter classroom periods augmented with online assignments.

An educated citizenry and a well-trained workforce are essential for the prosperity of our nation. Since today's children will be our future leaders, they deserve the best education this nation can provide. Two decades have now passed since the landmark government report, *A Nation at Risk* warned that “the education foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people.”¹⁵ This governmental report marked the beginning of an ongoing education reform movement that has resulted in improvements in many areas. Today's current education system, while challenged, is fundamentally sound and can be adapted to meet the concerns discussed above. The issues identified nation-wide are also found in Florida—high poverty schools, teacher retention, etc. These issues must be examined to ensure Florida's education system does not fall victim to these concerns. Florida has an excellent educational infrastructure—the Just Read, Florida Program, Florida Virtual Middle and High School system and over 140 industrial educational frameworks that guide education institutions are just some of the excellent examples. The application of these innovative programs on an excellent infrastructure will alleviate or preclude these national problems in Florida's educational system.

This project will hopefully contribute to that infrastructure and produce the desired product—an educated workforce capable of achieving high-tech/high-wage employment such as in the aviation and aerospace career cluster, in which the average income in Florida is over \$46,000 per year.

¹⁵ Department of Education, National Commission on Excellence in Education, *A Nation At Risk* (Washington, D.C., 26 April 1983), accessed 2 June 2004; available <http://www.ed.gov/pubs/NatAtRisk/index.html> : Internet.

Interviews with Industry and Education Representatives

During March, April, and May 2004, the consortium conducted several aviation and aerospace interviews across Florida—from Pensacola to Jacksonville, from Sanford to Sebring and then the Miami/Ft Lauderdale area. Each interview consisted of questions about specific industry knowledge and skill requirements as well as minimum education levels required for first-time employees. Since most of the aviation and aerospace jobs require a federal license or certificate, post-secondary educational degrees are not mandatory; however since 9/11/01, the supply of available employees has outweighed requirements and, educational degrees greatly benefit those trying to enter these career fields. Another important aspect to consider about the aviation and aerospace industries is that a highly trained, experienced, and desired workforce is always available as personnel leave the military forces. Almost all of these individuals leave the military with training on the most advanced equipment with at least an Associate's degree and many with a Bachelor's degree.

Aviation Maintenance. This area includes individuals who have received education and training in the **Aviation Airframe** and/or **Aviation Powerplant** frameworks, the **Avionics** framework, and the **Aviation Maintenance Management** frameworks. All Florida regions (NW, NE, Central, and South) were interviewed at businesses as large as a major Maintenance, Repair, and Overhaul facility for multiple major airline carriers which employs over 1000 people and businesses as small as 10 employees repairing aircraft avionics components. Since the aviation maintenance career field is heavily regulated by the Federal Aviation Administration (FAA), employees must receive adequate education and training before completing written, oral, and practical examinations. Once they have completed an extensive knowledge and skills demonstration, they become a qualified, certified, and/or licensed mechanic. However, most large businesses will hire high school graduates as journeymen and provide on-the-job training. Since the FAA requires a minimum of eighteen months of experience or two years of formal education before someone can take the FAA airframe or powerplant examination, the on-the-job training enables employees to obtain this essential prerequisite. Once a journeyman has the eighteen months experience, he or she can receive an on-site license that is valid only at the current facility and useful as a demonstration of qualified experience. Most small business initial employees come from a large supply of applicants with both educational qualifications and over three years of experience—especially since Florida businesses provide a high quality of life location and the cost of living is lower due to no state income tax.

One of the lessons learned about the aviation maintenance business is that all new employees must have their own tools to work in the industry. The tool list is quite extensive and expensive in some of the maintenance areas. These tool lists have been added to the current frameworks located in Section Two. For a career progression, a list of Florida institutions that offer this framework, and other information about this field, see Section Eight.

Airfield Management. There are 19 commercial airports and 111 general aviation airports in Florida. Often an airport manager may have one commercial airfield to manage as well as several general aviation airfields in close proximity. Interviews were conducted with airfield managers at a small airport with only general aviation flights, a small regional airport with only a few airlines serving the airport, a medium-sized international airport where airlines land throughout the day, and finally at one of Florida's busiest international airports where airlines fly around the clock. The preferred degrees are Airfield Management or Aviation Operations. According to the interviews, this career field requires at least a Bachelor's degree for entry-level employment. The primary area that most educational programs omit in their programs is an emphasis on public affairs and economic development of areas around an airport. Three areas the interviewees suggested be taught in the aviation operations/management degree are operations (maintenance, security, and dispatch), local real estate procedures and global marketing. Internships should be available at one of the commercial airports, which can provide an excellent opportunity to learn first-hand how to manage a small, medium or large airport and its facilities. As far as professional development requirements in this career field, economic development around an airport, budgeting, security, and airline lease/use agreements were some of the areas recommended for instruction. An Aviation Manager's Certificate is available through the American Association of Airport Executives (AAAE). To earn this certificate, a manager must write a thesis about a major problem that was fixed at the airport, then take a written and oral examination about all areas of the airport. Larger airports usually have managers with a Master's Degree in Business Administration or Airfield Management. To see more information about this career field, see Section Eight.

Air Traffic Control (ATC). Since this career field is assessed through either controllers who leave or retire from the military or civilian controllers trained at the Federal Aviation Administration (FAA) Academy in Oklahoma City, only one interview was accomplished at the Orlando International Airport facility. Additional interviews were accomplished at both Florida educational institutions (Embry-Riddle Aeronautical University and Miami-Dade Community College) that teach this program. In the US, there are approximately 15,000 civilian and 7,000 military controllers. The only way to enter the civilian ATC career field is through one of the thirteen College Training Initiative (CTI) schools sanctioned by the FAA. Only two of the thirteen CTI schools offer Associate's Degrees: Miami-Dade Community College and the Community College of Beaver County in Pennsylvania. The average civilian ATC student is older than 20, about 30 percent have a Bachelor's degree and some even have degrees in another program. An interesting fact discovered during the interviews was that about 30 percent of ATC students have at least their private pilot licenses. The maximum age to become an ATC graduate at the FAA Academy is younger than 31 years old. The FAA has an official internship program, but due to insufficient funds, the program is currently dormant. This career field only requires an advanced degree if a member is placed in an executive leadership position. Once an ATC graduate is hired, he or she is put on probation for a year to verify if the controller is compatible with the stresses and unique environment to which this occupation is exposed. Once cleared of the probation, controllers can work at Level 4 facilities (Dallas-Fort Worth and Atlanta Hartsfield

International are Level 11 facilities). Once proficient in controlling, employees become instructors and evaluators. The next level in the career is supervisors and managers. Unfortunately, the time lapse between college education that covered managerial concepts and the period required to have sufficient experience to become a facility manager puts the manager at a disadvantage to remember classroom-only management concepts. One manager requested that Florida schools offer a management refresher course or certificate to help prepare these managers for budgeting and human resource challenges. See Section Eight for more details.

Aircraft Design and Development. Florida currently has two new aircraft developers who are creating a single-engine propeller aircraft and a small twin-engine jet transport aircraft. Both aircraft are in the pre-certification and production stage and these companies primarily employ a few highly experienced engineers and mechanics. It will be a couple of years before they begin hiring additional engineers or mechanics, and they both plan to hire from a national pool of experienced personnel. These industries should provide an excellent source for cooperative and internship opportunities. Florida currently has five schools that provide an Aerospace Engineering Program. See Section Two for a proposed Aerospace Engineering Framework (this would be the first FLDOE university framework).

Other educational Institutions. The fifth area interviewed included public, private, and commercial educational institutions that are not part of the FLACCC consortium. Interviews intended to discuss their academic programs and how they maintain a viable curriculum that supports industry needs. Institutions visited were the Florida Institute of Technology, the Florida Memorial College, Miami-Dade Community College, the Nida Corporation (which teaches commercial Avionics Program), the Lively Aviation Mechanics Vocational School, and the Delta Connection Aviation Academy. These educational institutions as well as the consortium members teach all areas that are being reviewed for this grant project. The Nida Corporation and Delta Connection Aviation Academy are commercial training programs that teach only practical applications—Nida teaches Avionics and Delta teaches Professional Pilots. Both Nida and Delta use block-classes in which a group of students goes through the entire training program as a group. Both organizations believe this is the preferred method to help students build rapport among themselves, enabling the students to finish the program. A new concept used by Nida is to apply an "open entry open exit" philosophy through which a student can start and accelerate through a program as long as the required competencies are acquired (not contact time based). The course starts with theory, then experimentation, followed by practical applications, and finally examination. Another method that Nida uses to teach avionics is to teach hands-on applications first, then give the certification test, and finally complete the classroom and textbook knowledge requirement. This method of teaching reduced the training time in a US Navy program from 156 days to 63 days. One of the interviewees stated that math skills are eroding internationally, and that one of the most important areas needed in schools today are workforce/workplace readiness skills because work ethics is the number one concern in these industries. As far as recommendations to get information about the aviation and

aerospace fields to students, one interviewee suggested industry teams make visits to local schools because job fairs do not market the career fields soon enough.

Airline Pilots. Interviews were accomplished with several different airline and freight carrier pilots. As a result of the 9/11/01 impact on the major airline industry, the abundance of airline transport pilots has increased the minimum education-level criteria to the Bachelor's Degree—even though the minimum criteria for becoming an airline pilot is an FAA Air Transport Pilot license and a specific aircraft rating. The type of educational degree does not matter since the FAA regulates pilot abilities through oral, written, and practical flying examinations. Also, by the time a pilot has enough hours to qualify as an airline transport pilot, the time lapse since the educational degree could be as much as ten years. The Associate's Degree is currently the minimum education required for regional jet pilots since the flying hour requirements are much lower than those required for airline transport pilots and the demand for regional jet pilots was not affected as significantly as the larger airlines after 9/11/01. In fact, one interviewee stated that the corporate aviation business is "booming." For additional career information, see Section Eight.

Department of Defense. The military educates and trains members to be aviation and aerospace mechanics, air traffic controllers, airport and spaceport managers, as well as pilots and astronauts. The education is centralized, and students are put in block-classes that generally start and finish with the same students. Once a basic education is obtained, each military member is sent to specific education locations where again students are put in block-classes and normally graduate together. Once fully educated, these personnel are provided on-the-job initial and continuing training. Most are given the opportunity for additional civilian education and professional military education as they reach appropriate experience levels.

Section Two

This section will provide updated frameworks and current frameworks with recommended changes incorporated in the current documents. The consortium agreed that the general condition of all the frameworks is adequate to enable educators to build appropriate curriculum. However, some general recommendations for all frameworks are to standardize them in Microsoft Word format so hyperlinks can be used directly from the document and to make them easier to find on the Florida Department of Education (FLDOE) Internet Home Page.

Although the US Department of Education made the following suggestions about educational frameworks, the FLACCC consortium members do not believe adopting the US recommendations will provide Florida educators with more useful information than the current format provides.

The following are recommended framework format characteristics provided by the US Department of Education panel. Do the frameworks include examples? Among the 40 frameworks completed since 1990, 50 percent provide examples or models that illustrate application of content in classrooms; only 10 percent of frameworks prior to 1990 provided any examples. Diagrams, graphics, or photographs are used in 60 percent of the frameworks, as opposed to 33 percent of older frameworks. Twenty-five percent of the frameworks provide detailed, contextualized examples of teaching practices and discussion of classroom implementation, 50 percent of the frameworks outline or list possible teaching practices in a content area, and 25 percent focus only on content and do not address pedagogy. The teaching practices most frequently described in the frameworks are: (a) use of active, hands-on lessons; (b) using tools and technology; (c) conducting experiments and investigations; (d) writing and graphing; and (e) assessment strategies. What about equity? The frameworks provide few specifics on how to address equity in curriculum. Eighty percent of the frameworks address race/ethnic and gender equity concerns in the vision or rationale statement, but only 50 percent provide even one strategy or suggested practice for increasing equity in curriculum implementation. Finally, what issues were identified by teams of experts that reviewed the frameworks for this study? While these issues are based on a consensus of the experts forming the teams, they do not represent a view of 'one best way' to develop state frameworks. Instead, they are intended for use by states as they make decisions about organization and presentation of frameworks.

Standards set expectations for students. The review teams found that frameworks differ in the degree to which standards statements and language are consistent with the expectations that national standards establish for students. Some frameworks include standards statements that ask for only a low level of cognition, such as "know types of fossils," as opposed to a statement such as "conduct investigation to identify and explain differences in fossils." Content standards are less useful when they are written simply as a checklist of content topics to be covered or presented to students.

Clarity and consistency in language are important. The level and style of writing, use of graphics, and organization and format of the framework should be appropriate for the intended audiences. How the framework is organized and presented can be a key factor in initially inviting use of the framework and in readers returning to the document for further use.

Examples help to demonstrate intended content. The review teams noted that the use of examples, vignettes, and strategies allows the framework to make the vision and content recommendations concrete and explicit. They also provide the educator with a fuller understanding of the underlying approach to content and instruction.

Instructional emphasis and student skills can be interwoven with content knowledge. The review teams found that state frameworks show marked progress in expanding beyond a basic skills emphasis to instructional emphasis on higher order skills for all students in mathematics and science, such as expecting students to apply knowledge through problem solving, reasoning, communication, or scientific inquiry. When these areas are modeled through concrete suggestions, examples, and alternative practices, they reflect the new vision more effectively than when desired skills are presented as lists or objectives separate from content.

Frameworks show a need for strategies on equity in curriculum. The main equity issue in curriculum, largely not addressed in state frameworks, is the substantial differences in content taught to students, and how the curriculum differs by the race/ethnicity or gender of students. The review teams found that the frameworks all include a statement in the rationale or vision section regarding the need for greater equity in education, but fail to present strategies and practices that promote equity. Equity needs to be woven through the frameworks in a self-conscious way.

Content can be linked to assessment. State frameworks often recommend that classroom assessment be designed for consistency with content standards, but the review teams found only a few frameworks that provide models or examples of assessment exercises that exemplify standards. The frameworks generally recommend alternative assessment strategies for classrooms that are consistent with content standards, but typically they do not provide a strong link to reform of state assessment programs. There appear to be inconsistencies between framework content recommendations and the design of some required state assessments.

Frameworks should address the use of technology and tools in classrooms. Availability and appropriate use of high technology, such as calculators and computers, and other tools for doing coursework, such as rulers, scales, manipulatives, or laboratory equipment, should be addressed in state frameworks. An approach taken in one framework is a discussion of traditional, alternative, and recommended classroom uses of calculators and manipulatives.

All the targeted programs contain specific intended outcomes and student performance standards. Of the eight programs, secondary Aerospace Technology I/II/III,

post-secondary vocational Air Traffic Control, Aircraft Airframe Mechanics, and Avionics; community college Aerospace Technology, Professional Pilot, and Aviation Operations; and university Aerospace Engineering, most have current and viable technical competencies that meet industry entry-level requirements. However, the vocational Air Traffic Control frameworks need to be updated significantly and moved out of the vocational level into the community college level. The Avionics framework also needs updating to meet current industry requirements. The Professional Pilot framework requires minor changes. Of all the frameworks reviewed, the community college Aerospace Technology framework is the best format example, and all frameworks need to be updated to match its format.

2. The first goal of the consortium was to review the specific targeted secondary and postsecondary aviation and aerospace program standards. The consortium recommends the following regarding **2a)** technical competencies, **2b)** academic requirements, **2c)** workforce/workplace readiness skills such as teamwork and ethical practices, **2d)** equipment and software requirements, and **2e)** instructor qualifications.

2a. The consortium recommendations regarding the technical competencies of all programs are:

2.a.1. The General Aviation Maintenance Framework should be broken into four high school courses, but remain one Occupational Completion Point (OCP).

2.a.2. The consortium recommends that all frameworks include an internship/cooperative intended outcome. Either the FLDOE or Workforce Florida Incorporated (WFI) should subsidize these internships. For an additional \$3 to \$5 per hour, per student, the incentive would assist organizations in providing the opportunity and would also serve to attract the targeted students.

2.b. The consortium recommends the following regarding academic requirements.

2.b.1. Each framework contains an exit Test Adult Basic Education (TABE) score required to receive credit for completing a specific program. The consortium recommends that students be encouraged to demonstrate proficiency (meet TABE scores) prior to starting an aviation or aerospace program. However, for students with English as their second language or who perform poorly with mathematics, the consortium recommends these students not be forced to take an entry exam (especially at the AAS or AS/ vocational level). Also, instead of a traditional English and Algebra course being the first courses these students take, educational institutions should place these students in an applications course in which students learn workforce skills such as reading blueprints, cutting sheet metal, or using different drill bit sizes before taking Algebra and English academic courses. Results at one community college were favorable using this learning technique.

2.c. The consortium recommends the following changes to the targeted program workforce skill outcomes.

2.c.1. The consortium recommends the current Florida frameworks be modified to include the workforce/workplace readiness skills intended outcomes and performance standards used by another state. Most industries interviewed emphasized that schools should treat employability or soft skills as mandatory learning outcomes just like math and science skills. Therefore, a lengthy learning outcome and performance standard has been added to the new frameworks found later in this section.

2.d. The consortium recommends the following regarding specific framework equipment and software requirements.

2.d.1. All frameworks should have a list of equipment/tools a student will be competent in upon completing the program. The frameworks at the end of this section have specific tools and equipment added to them. Also, the equipment list and knowledge/skills should be placed on the back of every diploma or certificate provided by the educational institution. We also recommend that, for jobs that require the entry-level employee to provide personal tools for an aviation, avionics, or aerospace job, a low-cost loan program should be available, or the cost of these required tools should be included in the tuition/fee system at the educational institution as part of the academic requirement.

2.d.2. Prior to starting a program, a secondary and post-secondary school must demonstrate the ability to procure equipment and software currently being used as the industry standard or at least representative of the general standard.

2.d.3. To maintain a program, each secondary and post-secondary school should demonstrate their equipment and software complies with industry standards.

2.e. The consortium recommends the following regarding instructor qualifications to teach a specific program.

2.e.1. The consortium recommends instructors take an externship (participate in industry training) every five years to accomplish re-certification requirements.

2.e.2. The consortium recommends the FLDOE develop a mechanism (aviation- or aerospace-related) so teachers can use this training mechanism toward re-certification.

2.e.3. The consortium recommends instructor qualifications should be minimum certification level for each educational program with specific experience in the discipline they are teaching. Although the specific criteria are beyond the scope of this report, instructors should have related industry experience (subject matter expertise) applicable to the discipline being taught. For high school, the minimum should be state certification and/or subject matter expertise. For vocational education, the minimum should be a certificate of education (COE) and/or subject matter expertise. For community college, the minimum should be in accordance with regional accreditation board's academic qualification and several years of recent experience in the discipline. For universities, the minimum should be in accordance with regional accreditation board's requirements and

several years of recent experience in the discipline. These specific qualifications have been included in each of the frameworks later in this section.

2.e.4. The consortium recommends all instructors should meet appropriate experience levels required for industry certification where such certifications exist (or experience levels should be reviewed by a school advisory board consisting of industry representatives every three or five years).

2.e.5. The consortium recommends vocational/technical teachers and community college instructors who teach at the career and technical levels need educational experience (such as workshops for teachers on how to teach, test development and effective test result evaluations, classroom management, and how to integrate academics into technical courses).

Section Three

3. The consortium has the following recommendations that will demonstrate how these suggestions will foster seamless articulation for students from one educational level to the next that will require little if any need to refresh or remediate for the same competencies.

3. a. The consortium recommends that the Florida Department of Education (FLDOE) work with community colleges and high schools to develop a basic core curriculum that would be common to any technical subject area in the high technical/high wage sectors. The FLDOE would then secure articulation agreements with all Florida universities and community colleges to accept the coursework offered in this basic core curriculum toward an Associate in Science or Associate in Arts degree. Harmonization is the terminology used to describe a similar program in Europe. The proposed plan would create a standard basic curriculum of math, science and basics of workplace readiness skills (formerly referred to as soft skills) to meet the requirements of a core curriculum as a prerequisite to any technical subject area, whether it be aviation, aerospace, electronics, medical, etc.

3.b. This common basic curriculum would enable a student to choose multiple paths of technical areas of study with minimum costs in terms of dollars and time duplicating courses taken when transitioning from one program to another. As a result, a student changing his major after entering a technical program of study would not have to “start all over” with any of these basic core requirements. For example, an avionics technician could quickly become competent in similar occupations such as medical equipment maintenance, or a professional pilot student could transition to an air traffic control curriculum.

3.c. The consortium further recommends that the FLDOE negotiate a universal articulation agreement between all Florida universities and community colleges to accept coursework in aviation- and aerospace-related frameworks. These frameworks would be standardized whether taught at the high school, community college, or university level. This would enable a student to change academic locations throughout Florida without having to retake additional coursework that has already been successfully completed.

3.d. The consortium recommends that English and Mathematics teachers be provided the opportunity to attend vocational education facilities to offer courses in how to improve the Test for Adult Basic Education (TABE) scores.

3e. The consortium recommends the FLDOE create specific subject mater materials to deal with people workforce/workplace skills. This includes basic material such as workplace behavior, working with teams, dress, integrity and work ethics that include dependability, accountability, and reliability. This is the most noted problem area mentioned by a majority of business owners.

Section Four

4. The consortium recommends each targeted framework include usable hyperlinks to provide additional information and on-line distance learning products and their applicability to each program standards. The consortium has provided applicable websites in each of the appropriate frameworks.

4.a.1. The consortium recommends a list of “aviation and aerospace science fair” projects and topics be provided on websites available to middle and high school teachers.

4.a.2. The consortium recommends website links like [Http://florida.echoices.com](http://florida.echoices.com) or <http://www.avjobs.com> be included in middle and high school awareness Flyers (see Attachment 1 for possible Flyer examples).

4.a.3. The consortium recommends Florida’s existing Aerospace Technologies I/II/III courses or the Civil Air Patrol curriculum, found at <http://www.allstar.fiu.edu>, be included on the Florida Virtual High School and Florida Virtual Middle School websites as extracurricular courses.

4.a.4. The consortium recommends the Virtual Job Shadow website (<http://www.jobshadow.org/index.html>), which provides teachers with information related to various aviation projects be used in Science, Math, and Reading classes. The consortium further recommends the Department of Education or local school boards create an incentive program to encourage teachers to complete the program.

4.a.5. The following links are available to supplement or enhance any science, math, reading, aviation or aerospace curriculum or provide distance-learning coursework for students (a separate sheet of distance-learning websites by curriculum framework is located in Attachment 4).

4.a.6. The following hyperlinks are available for school instructors to use with aviation- and aerospace-related courses.

For middle schools: Your 6th, 7th, and 8th Grade students can take off to learning through the [Wild Blue Wonders](http://www.wildbluewonders.com) learning program presented by Ford Motor Company. The program is an excellent team-based after-school learning experience or an enrichment for classroom activities. Groups of students learn about aviation, use sectional charts, perform research, visit an aviation museum and make presentations in this exciting program. The Wild Blue Wonders program comes complete with sectionals, manual, Microsoft Flight Simulator and kit materials for competition. Visit www.wildbluewonders.com for more information.

For high schools: Make aviation fundamentals available to your students through distance learning. This high school Science credit course is taught by certified teachers through BadgerNet. To obtain more information, contact dlearning@eaa.org.

OTHER WEBSITES AND LINKS

<http://www.X-zylo.com>

X-zyLo is an astonishing flying gyroscope that has fascinated people of all ages and intrigued scientists with its superb flight characteristics. For a full study guide and special school curriculum as well as great prices on X-zylo for classrooms, [contact](#) the William Mark Corporation.

<http://sats.larc.nasa.gov/precollege.html>

Website to explain Small Aircraft Transportation System and includes school problems and worksheets.

http://education.nasa.gov/divisions/eleanorsec/overview/F_pathfinder_edu_astronaut.html

NASA's Astronaut Educator Program

<http://www.allstar.fiu.edu/>

Comprehensive aviation and aerospace website with science, history, and math lessons for middle and high school students.

<http://www.faa.gov/education/index.cfm>

The FAA education website with educational information.

<http://www.faa.gov/education/resource.htm>

FAA information about aviation schools, career information, and federal programs.

<http://quest.arc.nasa.gov/aero/teachers/learning.html>

NASA Quest Aerospace Lesson Plans for K-12

http://www.nasa.gov/audience/foreducators/F_NASA_Program_Inventory.html

A Guide to all NASA Educational programs.

<http://www.bizworld.org/>

A website for K-6/7 to teach elementary students entrepreneurial skills such as marketing, budgeting, production, and human resources.

<http://www.state.nj.us/njded/frameworks/ccwr/appendixg.pdf>

Ten pages of workforce skills and websites...NJ education site.

<http://www.planemath.com/activities/pmenterprise/index.html>

Learn how to design a plane.

<http://www.planemath.com/activities/pmactivities4.html>

Learn math while learning about aviation.

<http://www.wvonline.com/skyschool/page6.htm>

Great list of aviation websites for students and teachers.

<http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/newton/Stllite.html>
Satellite technology website and experiments.

<http://www.howstuffworks.com/space-shuttle.htm>
Information on the Space Shuttle Program and how spacecraft work.

<http://science.howstuffworks.com/airplane.htm>
Information on how airplanes fly.

<http://nmwg.cap.gov/santafe/Activities/OtherActivities/ActivityIndex.htm>
Aerospace education activities for teachers to use in all types of classes

<http://www.dot.state.mn.us/aero/aved/teachers/index.htm>
Minnesota DOT website with aviation curriculums and prof development information.

<http://www.dot.state.mn.us/aero/aved/pdf/augie.pdf>
Activity workbook on the first African America Airline pilot.

<http://kids.msfc.nasa.gov/defaultNoFlash.asp>
NASA Internet resources for K-20 and professional development

<http://www.dtae.org/>
GA virtual technical colleges

<http://www.faa.gov/education/ACEcamp.htm#Eastern%20Region>
FAA sites that offer aviation centers of excellence (ACE) flying camps

<http://www.gnacademy.org/mason/catalog/browse/topic/Engineering/Aerospace>
Website with nation-wide DL aviation/aerospace courses

AIRCRAFT FLIGHT

Web sites that describe how airplanes fly.

<http://www.kidwings.com/teacher/flight/>
Simple experiments on Bernoulli's Principle

<http://www.fi.edu/flights/own2/forces.html>
Numerous pages that describe the science of flight

<http://www.gomilpitas.com/homeschooling/explore/flight.htm>
A very comprehensive list of flight information and also history, hot air balloons, model planes, etc.

<http://www.workman.com/fliersclub/download.html>

<http://www.workman.com/fliersclub/links.html>

Some fun with paper airplanes.

<http://www.howstuffworks.com/airplane.htm>

Another list of flight information.

<http://www.lerc.nasa.gov/WWW/K-12/airplane/airplane.html>

Parts of the airplane Boeing 767 size

http://www.grc.nasa.gov/WWW/K-12/BGA/Dan/airplane_parts_act.htm

A test for the parts of the airplane Boeing 767 size.

<http://www.allstar.fiu.edu/aero/fltmidparts.htm>

Parts of the airplane with videos and experiments.

<http://www.eaa1000.av.org/yeagle/eagle3.htm>

More on parts from an EAA chapter.

<http://www.faa.gov/education/documents/other/mainpart/>

Download worksheets for parts and the instrument panel

AVIATION HISTORY WEB SITES

<http://www.aviation-history.com/>

This has a little bit of everything, including aircraft recognition and a section on the theory of flight.

<http://www.ninety-nines.org/bios.html>

List of articles on women in aviation history

<http://aerofiles.com/>

It has a great chronology list of firsts in aviation. Plus lots of pictures and NO advertising.

<http://www.webring.org/cgi-bin/webring?ring=avihistory;list>

This is very comprehensive list of aviation history sites. Excellent if you don't mind waiting for all the ads to download.

<http://www.airmailpioneers.org/>

A site dedicated to the history of the early airmail pilots.

<http://www.tighar.org/>

This is the group that is looking for Amelia Earhart's Lockheed Electra in the South Pacific. Not a lot of history, just interesting information.

<http://www.braniffinternational.org/>

This is on the web ring listed above. An excellent site that describes the era of the airlines regulation.

<http://www.fas.org/irp/mystery/history.htm#38>

This has interesting information on former SECRET aircraft.

TEAM BUILDING IDEAS

<http://www.businessballs.com/teambuildinggames.htm>

This link has lots of ideas on and examples of team building exercises. Some of them may not work for the Wild Blue Wonders team but a lot will.

The following are websites from the Wild Blue Wonders research effort.

AIR AND AVIATION MUSEUMS

AirVenture Museum, Oshkosh, WI - <http://museum.eaa.org/>
Aviation & Space Center of the Rockies, Denver, CO - <http://www.wingsmuseum.org/>
Evergreen Aviation Museum, McMinnville, OR - <http://www.sprucegoose.org/>
Fernbank Science Museum, Atlanta, GA - <http://fsc.fernbank.edu/>
March Field Museum, Riverside, CA - <http://www.marchfield.org>
Museum of Aviation Robins AFB, Macon, GA - <http://www.museumofaviation.org/>
National Museum of Naval Aviation, Pensacola, FL - <http://www.naval-air.org/>
Pima Air and Space Museum, Phoenix, AZ - <http://www.pimaair.org/index.html>
Museum of Flight, Seattle, WA - <http://www.museumofflight.org/>
Sun N Fun Air Museum, Lakeland, FL - <http://www.sun-n-fun.org/content/museum/main.asp?section=museum>
United States Air Force Museum, Dayton, OH - <http://www.wpafb.af.mil/museum/>
Virginia Air and Space Museums, Hampton, VA - <http://www.vasc.org/>
International Women's Air & Space Museum - <http://www.iwasm.org/>

AIRCRAFT FLIGHT

Web sites that describe how airplanes fly.

<http://www.kidwings.com/teacher/flight/>

Simple experiments on Bernoulli's Principle

<http://www.fi.edu/flights/own2/forces.html>

Numerous pages that describe the science of flight

<http://www.gomilpitas.com/homeschooling/explore/flight.htm>

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<http://www.workman.com/fliersclub/links.html>

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<http://www.howstuffworks.com/airplane.htm>

Another list of flight information.

<http://www.lerc.nasa.gov/WWW/K-12/airplane/airplane.html>

Parts of the airplane Boeing 767 size

http://www.grc.nasa.gov/WWW/K-12/BGA/Dan/airplane_parts_act.htm

A test for the parts of the airplane Boeing 767 size.

<http://www.allstar.fiu.edu/aero/fltmidparts.htm>

Parts of the airplane with videos and experiments.

<http://www.eaa1000.av.org/yeagle/eagle3.htm>

More on parts from an Experimental Aircraft Association chapter.

<http://www.faa.gov/education/documents/other/mainpart/>

Download worksheets for parts and the instrument panel

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A site dedicated to the history of the early airmail pilots.

<http://www.tighar.org/>

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<http://www.braniffinternational.org/>

An excellent site that describes the era of the airlines during regulation.

<http://www.fas.org/irp/mystery/history.htm#38>

This has interesting information on former SECRET aircraft.

<http://www.wwiaviation.com/toc.shtml>

A comprehensive list of everything aircraft from WWI

<http://directory.google.com/Top/Recreation/Aviation/Historic/>

A Google search result page with interesting entries on Airlines and Women in Aviation.

<http://www.helis.com/prin1.htm>

The introduction to a site that has the history of helicopters on one of the links.

<http://www.nasm.edu/nasm/rc.htm>

The information page on the collections at the National Air and Space Museum run by the Smithsonian.

AVIATION HISTORY TIMELINES

<http://www.countdowntokittyhawk.com/sponsors/ford/innovations.html>

http://www.usd298.com/les_library/flying_machines.htm

<http://www.familyeducation.com/article/0,1120,24-4261,00.html>

<http://www.lindberghfoundation.org/history/aviation-hist.html>

http://www.aviationhistory.org/ah_aviation_timeline.html

<http://www.aerofiles.com/chrono.html>

<http://www.geocities.com/siafdu/triviac.html>

<http://www.cradleofaviation.org/timeline/>

<http://ltp.larc.nasa.gov/flyingstart/aviationtimeline.html>

<http://www.pbs.org/kcet/chasingthesun/timeline/1910.html>

http://womenshistory.about.com/library/misc/bl_aviation_timeline.htm

<http://www.ninety-nines.org/bios.html>

<http://library.thinkquest.org/21229/timeline.htm>

http://www.yahooligans.com/Science_and_Nature/Machines/Airplanes_and_Flying/Histo ry_of_Flight/

METEOROLOGY CODED WEATHER INFORMATION

Use these links to get information on how to decode METAR information. The wind and cloud information is used during the Flight Plan portion.

<http://www.avweb.com/other/metarabv.html>

Abbreviations

<http://www.avweb.com/other/metartaf.gif>

Decode card

<http://weather.noaa.gov/weather/metar.shtml>

Enter airport codes and practice

HOW WEATHER HAPPENS

Links to Weather related Lesson Plans

<http://weathereye.kgan.com/>

Basic weather lessons. How weather happens.

<http://www.buildingrainbows.com/CA/lesson/lessonid/1013033501>

Condensation lesson.

<http://www.lessonplanspage.com/ScienceTheWaterCycle46.htm>

Evaporation and Condensation.

<http://k12.ocs.ou.edu/teachers/lessons/dewpoint.html>

Relative Humidity and Dewpoint

<http://k12.ocs.ou.edu/teachers/lessons/moistureadvection.html>

How moisture and wind work together to create weather

<http://k12.ocs.ou.edu/teachers/lessons/airmasses.html>

Lesson on Air Masses (fronts). If lesson doesn't work has good vocab section.

<http://www.uen.org/Lessonplan/preview.cgi?LPid=1333>

Hot air rises.

[http://askeric.org/cgi-](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Careers/MCR0200.html)

[bin/printlessons.cgi/Virtual/Lessons/Mathematics/Careers/MCR0200.html](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Careers/MCR0200.html)

A lesson that includes weather and flying!

[http://askeric.org/cgi-](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0010.html)

[bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0010.html](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0010.html)

High and Low pressure

[http://askeric.org/cgi-](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0201.html)

[bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0201.html](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0201.html)

Cloud lesson

[http://askeric.org/cgi-](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0003.html)

[bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0003.html](http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Meteorology/MET0003.html)

Cloud formation demonstration

<http://www.wxresearch.org/education/definitions.html>

Weather vocabulary

[http://ww2010.atmos.uiuc.edu/\(GI\)/guides/crclm/act/home.rxml](http://ww2010.atmos.uiuc.edu/(GI)/guides/crclm/act/home.rxml)

Lots of weather lessons on various subjects.
<http://projects.hprtec.org/trail/tracks/c00001af.html>
Another group of weather lessons

AIRCRAFT PICTURES

<http://aircraft.newspeak.org/>
<http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/44-80/preface.htm>
<http://www.dunlopaircrafttyres.com/gallery/index.htm>
<http://www.kilroywashere.org/005-Pages/AC-Rec/05-AC-Recog-01-.html>
<http://www.fas.org/man/dod-101/sys/ac/>
http://147.71.210.21/vacr/gta/USAANDALLIED_files/frame.htm
<http://us-aircraft.com/walk/walkarouds.htm>
<http://www.flyingzone.co.uk/knowyouraircraft/knowyouraircraft.htm>
<http://www.aerospaceweb.org/aircraft/jetliner/index.shtml>
<http://www.aerospaceweb.org/aircraft/commuter/index.shtml>
<http://www.aerospaceweb.org/aircraft/fighter/index.shtml>
<http://www.aerospaceweb.org/aircraft/bomber/index.shtml>
<http://www.aerospaceweb.org/aircraft/attack/index.shtml>
<http://www.aerospaceweb.org/aircraft/recon/index.shtml>
<http://www.aerospaceweb.org/aircraft/maritime/index.shtml>
<http://www.aerospaceweb.org/aircraft/transport-m/index.shtml>
<http://www.aerospaceweb.org/aircraft/helicopter-m/index.shtml>
<http://www.aerospaceweb.org/aircraft/research/index.shtml>
<http://home.planet.nl/~wees0131/>
<http://www.aviation.about.com/cs/unusualaircraft/>
<http://www.helis.com/prin1.htm>

WRIGHT BROTHERS WEB SITES

<http://www.countdowntokittyhawk.com/>
<http://www.wrightexperience.com/>
<http://www.hfmgv.org/exhibits/wright/>
<http://www.wam.umd.edu/~stwright/WrBr/Wrights.html>
<http://www.first-to-fly.com/>
<http://www.wrightflyer.org>

Section Five

5. The consortium recommends the following information as a way of complying with the President's Initiatives, the Florida Sunshine State Standards, and the Just Read, Florida program.

First, the consortium's review of Florida's current education status revealed that it is leading the nation in student achievement in the elementary grades; however, the gains taper off in the middle grades. Recently through legislative action (Middle Grades Reform Act), Florida budgeted \$98.5 million for the Just Read, Florida program. Included in the \$98.5 million is \$16.7 million targeted to fund reading coaches in 282 middle schools with priority given to students in the lowest performing schools.

The College Board (<http://www.collegeboard.com/about/index.html>) is a not-for-profit membership association whose mission is to connect students to college success and opportunity. Founded in 1900, the association is composed of more than 4,500 schools, colleges, universities, and other educational organizations. Each year, the College Board serves over three million students and their parents, 23,000 high schools, and 3,500 colleges through major programs and services in college admissions, guidance, assessment, financial aid, enrollment, and teaching and learning. Among its best-known programs are the SAT®, the PSAT/NMSQT®, and the Advanced Placement Program® (AP®). The College Board is committed to the principles of excellence and equity, and that commitment is embodied in all of its programs, services, activities, and concerns. Since the inception of the SAT® preparatory program, 94 percent more minority students are taking advanced placement courses in Florida schools. During the same period, the number of students taking the practice SAT® has more than tripled, with four times as many African-American students taking this college prep test in 2003 than 1998. Governor Bush calls for making this program permanent in Florida by putting it in law, thereby ensuring that more Florida students have access to higher education, as well as tutoring programs and information on college opportunities.

A review of Florida's community colleges revealed that *Community College Week Magazine* recognized thirteen of Florida's twenty-eight community colleges among the "Top 100 Associate's Degree Producers." More students are graduating from Florida's community colleges than ever before, with enrollment up eight percent and graduation rates increasing by 12 percent. As Florida student achievement continues to rise, the state must plan for increased enrollment in its community colleges and state universities.

5.a. The consortium recommends the following will increase awareness of aviation and aerospace programs and therefore increase the number of students taking rigorous academic curriculum so they will be fully prepared for post-secondary education and high-skilled entry-level employment.

5.a.1. The consortium recommends Florida Comprehensive Assessment Test (FCAT) include sample reading, math, and science questions related to aviation and aerospace.

5.a.2. The consortium recommends teacher worksheets that use aviation and aerospace examples for math, reading, and science be provided to teachers to use in schools.

5.a.3. The consortium recommends FCAT website sample questions provided for parents include aviation-related examples.

5.a.4. The consortium recommends that the Florida Department of Education (FLDOE) solicit the necessary funds to acquire aviation/aerospace-related books for school libraries and classrooms. School libraries or media centers and classrooms should be provided aviation/aerospace-related books for students of all ages and reading levels from elementary school to high school. Providing schools with more aviation/aerospace books will serve as a means of introducing the students to aviation/aerospace as well as promoting the students' interest in aerospace or aviation. Just as a child selects sports-related books to read, another child may wish to select a book about airplanes.

5.a.5. The consortium recommends the FLDOE provide more aviation-related supplemental reading books for 2nd-4th grade students. One example is the book *Hatchet*, by Gary Paulsen. Other resources can be found on the ALLSTAR website <http://www.allstar.fiu.edu>.

5.a.6. The consortium recommends a one-time grant be given by the FLDOE to a national program based on aviation, which emphasizes developing math, science, and reading skills as well as workforce development. The program should be available year-round and presented in a format compatible to classrooms and local workforce board facilities. The program could be presented through schools for remediation for at risk youth and for development of workforce skills (sometimes referred to as "soft" skills). The program would need to have documentation that showed grade-level improvements in math and science aptitude scores.

5.a.7. The consortium recommends that schools, beginning with the middle school grades and upward, provide career counseling to all students. Appropriate guidance counseling tools such as brochures, informational CD's or videos relating to careers in aviation and aerospace could be produced and made available to all guidance offices. In addition, information related to the many different types of jobs related to aviation and/or aerospace, to include salary information could be included. Some schools may wish to make career informational kiosks available to students at the school.

5.a.8. The consortium recommends high schools consider allowing a "One-Stop" Career Center be located on the school campus to acquaint students with career opportunities earlier in their education. For example, the Virginia Peninsula Academic Tech Program (E-mail at TechPrep@tncc.vccs.edu for more information) provides students with a comprehensive, competency-based six-year program (9-14 grades). This program provides academic and technical skills development, employability skills training, work-based learning, college cooperative work experience, and, in some cases, college financial support from area companies.

5.a.9. The consortium recommends junior and senior college students in aviation/aerospace programs provide career counseling/mentoring to middle and high school students as an independent study or work study while in college.

5.a.10. The consortium recommends that more teachers be invited to attend workshops at aviation/aerospace colleges to increase awareness of aviation aerospace programs. With the increased awareness, teachers may be able to promote student interest through science projects and/or science fairs.

5.a.11. The consortium recommends programs such as the Civil Air Patrol Aerospace Education curriculum be used as an elective credit in high schools.

5.a.12. The consortium recommends that the FLDOE solicit aviation and aerospace competition programs like the robotics competition held by the For Inspiration and Recognition of Science and Technology (FIRST) organization. For more information on this organization, see the following website: <http://www.usfirst.org/>. FIRST designs accessible, innovative programs to build self-confidence, knowledge and life skills while motivating young people to pursue opportunities in science, technology and engineering.

5.a.13. The consortium recommends the FLDOE and/or Workforce Florida Incorporated (WFI) solicit the various state and national aviation and aerospace professional associations to compile an occupation list by skill and location. Some examples include Organization of Black Airline Pilots, Florida Aviation and Aerospace Alliance, Aircraft Owners and Pilot Association, and alumni associations. These organizations/associations could survey their membership and provide information for a directory available to schools and youth organizations.

5.a.14. Florida is fortunate to have the Kennedy Space Center located in the state. This facility is excellent for teaching adults and students about current and future air and space programs. The consortium recommends that the Florida Department of Education coordinate with the Kennedy Space Center to create a program similar to the one recently started at the Johnson Space Center in Houston, Texas to help middle school teachers. This unique professional development opportunity gives Math and Science teachers an opportunity to integrate NASA instructional resources into their own middle school curriculum, emphasizing real-world applications. Eighty middle school teachers attend a one-week summer workshop at Johnson Space Center developing an “action plan” focusing on teaching math and science concepts from a different perspective. Using the space program as a motivator, these educators introduce their students to the role that math and science play in many career opportunities. Along with the summer workshop, this program also provides a series of distance-learning events throughout the following school year. Through the distance-learning program, students may interact with experts in the space program without ever having to leave their schools!

5.b. The following recommendations will increase high school graduation rates.

5.b.1. The consortium recommends that schools promote peer-counseling programs through which good academic students can earn credits toward their community service hours for tutoring at risk students. At risk students are those who may be close to dropping out of school. A program through which students help their fellow students may be successful in preventing dropouts.

5.b.2. The consortium recommends that schools' guidance or career counselors provide at risk and other students with information regarding the specific programs on aviation and aerospace jobs that do not require a BS or AS degree. The consortium also recommends that the FLDOE provide information related to aviation and aerospace programs and aviation camps to the Agency for Workforce Innovation (AWI) and the One Stop Career Centers to promote awareness to at risk and low-income students.

5.b.3. The consortium recommends that the FLDOE and/or school boards contract with aviation summer camps to teach math and science with aviation examples. The FLDOE should provide scholarships for low-performing students on the FCAT as well as low-income or at risk students needing remediation in reading, math, or science and test taking skills. The assumption is that these summer camps may encourage students to remain in school and encourage an interest in the pursuit of aviation/aerospace-related jobs. The NASA Science, Engineering, Math, and Aerospace Academy (SEMAA) (located at <http://www.semaa.net/AboutUs/>) is an example. The Academy offers a free week-long summer camp to low-income students and exposes them to math, science, and reading using aerospace examples and problems.

5.c. The consortium is aware of the governor-supported 18-hour graduation program. For a few students, this program is appropriate. However, the consortium does not recommend this programs for most high school students. The consortium believes the 18-hour program may result in graduating students who are unprepared socially or mentally for postsecondary education rigor and/or for employment. A study by the University of West Florida Haas Center (see <http://haas.uwf.edu>) on first-time employees revealed that most first-time employees lack dependability, do not take responsibility, and do not have the work ethics employers demand. The consortium does, however, suggest that more dual-enrollment programs with community colleges and/or vocational schools be made available to high school students to enable them to earn postsecondary credits while attending high school. Such programs would provide the student with a head start on his/her postsecondary education credits in addition to providing monetary savings for the students and/or parents. The consortium also recommends more dual- enrollment program awareness be made available at the middle school level.

5.c.1. The consortium recommends high school students be encouraged to dual enroll in either community college courses or vocational education courses. One advantage of dual enrollment is the reduction of student cost for a postsecondary education. Dual enrollment could be accomplished by classroom instruction provided by college faculty or through a distance-learning program offered on the Internet. A website offered by Everglades University to assess compatibility for distance- learning courses is located at: <http://www.evergladesuniversity.org/dl/index.learn?action=welcome&subaction=isonline>

5.c.2. The consortium recommends Florida community colleges offer a high school dual-enrollment program in aviation/aerospace coursework such as the programs offered by Florida Community College at Jacksonville or George T. Baker Aviation Academy in Miami (see Attachment 3 for the CD). In addition to dual enrollment, classes may also be offered as distance-learning or night courses.

5.c.3 The consortium recommends the FLDOE consider initiating a program similar to the Nevada program designed to increase rigor among middle and high school students as follows. Thousands of Nevada students will benefit from a \$585,838 grant to help low-income students have greater access to and perform better in advanced courses. The grant is part of the *No Child Left Behind Act's* Advanced Placement Incentives program and is a competitive two-year award to increase the number of students in middle and high school who take and succeed in advanced courses. The state of Nevada will use the funds to make grants to local school districts serving schools with 40 percent or more low-income students. The grants will enable the identified school districts to develop and align pre-Advanced Placement and Advanced Placement programs at the middle and high school levels, as well as to pay for professional development for teachers. In addition, before-school, after-school, weekend and summer classes that strengthen students' critical thinking skills will be supported.

Section Six

6. The consortium recommends the following marketing and distribution methods be used to increase student interest in the aviation and aerospace fields.

6.a. The consortium recommends the Florida Department of Education (FLDOE) provide minority students with specific information about the opportunities and eligibility requirements for aviation and aerospace educational programs and employment. The consortium suggested the FLDOE could facilitate an awareness program with the help of the Association for Women in Aviation Maintenance (AWAM) or the Organization of Black Airline Pilots (OBAP) to reach minority students at the middle and high school levels.

6.b. The consortium recommends minority role models in all segments of the industry produce a video or CD for students' or teachers' awareness. An example CD created by one of the consortium members, Florida International University, is provided in Attachment Three.

6.c. The Florida Air National Guard About Face! program provides life skills and drug awareness training, including mentoring assistance to youth between the ages of 13 and 17. Participants must meet eligibility standards. The About Face! program is held at local National Guard armories in pre-selected areas throughout the State of Florida. Year-round sites are currently operating in Ft. Myers, Ft. Pierce, Jacksonville, Tampa, and Tallahassee. During the summer, 27 total sites will be operational. Since the About Face! program began in 1997, it has served a total of 5,368 participants. Of those, 88.5% (4455) have successfully completed the program and have shown an increase in academic performance. Students participate in an activity-based curriculum designed to focus on functional life skills and the improvement of basic skills. All activities are reality-based, allowing students to see the relevance of the skills they are learning. The 10:1 student/instructor ratio allows for a tremendous amount of individual instruction. Students receive both traditional instruction and Computer Assisted Instruction. Drug Awareness Training through the National Guard's anti-drug program, along with a strong smoking prevention curriculum, gives students the opportunity to discover the dangers of drug and tobacco use. The About Face! program also works to provide mentors from the community to assist students in their work. The consortium recommends the Florida National Guard About Face! program includes an aviation/aerospace awareness program.

6.d. The consortium recommends a team of aviation/aerospace organizations such as Civil Air Patrol cadets provide aviation and aerospace awareness/exposure to middle and high school students.

6.e. The FLDOE Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) is a discretionary program designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education. GEAR UP provides five-year grants to states and partnerships to provide services at high-poverty

middle and high schools. GEAR UP grantees serve an entire group of students beginning no later than the seventh grade and follow the cohort through high school. GEAR UP funds are also used to provide college scholarships to low-income students. GEAR UP is unique from other initiatives. This program employs partnerships committed to serving and accelerating the academic achievement of cohorts of students through their high school graduation. GEAR UP partnerships supplement (not supplant) existing reform efforts, offer services that promote academic preparation and the understanding of necessary costs to attend college, provide professional development, and continuously build capacity so that projects can be sustained beyond the term of the grant.

The Florida 5000 Role Models program is another program the consortium believes should have an aviation/aerospace awareness program. This summer in Dade County, Florida, 3000 African-American students are gaining life skills, academic inspiration and social education from the 5000 Role Models of Excellence Project. At risk youth are matched with successful adult volunteers who meet with them regularly to provide advice and guidance while educating them on social issues. The consortium recommends that role models provide aviation/aerospace information to youth in this program.

6.f. The consortium recommends that the FLDOE solicit sponsors to provide scholarships to low-income students and/or schools to attend Florida air shows.

6.g. The consortium also recommends that the FLDOE solicit sponsors to provide scholarships to low-income students to attend aviation summer camps to promote awareness of aviation and aerospace opportunities.

6.h. The consortium recommends that the FLDOE develop awareness brochures, CD's and/or videos related to aviation and aerospace educational programs and career paths, to include the potential income opportunities, for use by guidance and/or career counselors. The ALLSTAR program is an example of a CD developed by Florida International University. A copy of the ALLSTAR CD program is located in Attachment Three.

6.i. The consortium recommends that the FLDOE provide aviation and aerospace articles for a weekly reader or newspaper to both middle and high school students (initially target middle and high schools that offer the Aerospace Technologies I/II/III programs). An example is attached Attachment 1.

6.j. The consortium recommends that both the FLDOE and local school boards provide each school library and/or media center and each public library with an aviation and aerospace informational kiosk. The kiosk would be equipped with information relating to aviation and aerospace educational programs and career paths.

6.k. The consortium recommends the FLDOE/Department of Transportation create videos/CDs/DVDs to promote all HI Wage/HI Tech jobs around airports by incorporating the information on the Continuing Florida Aviation Systems Planning Process (CFASPP) website. The CFASPP was established by the Federal Aviation Administration (FAA) and Florida Department of Transportation (DOT) because of the need for a method to

help maintain a viable statewide aviation environment. The objective of FAA, FDOT and CFASPP is to maintain and enhance the Florida aviation system. A primary function of CFASPP is to help keep the Florida Aviation System Plan (FASP) in step with the constant changes by updating the FASP periodically. Presently, the FASP is undergoing its third major five-year update, a process called the *FASP 2000*. This effort includes both a Planning Component and the development of an Aviation Database. To support the CFASPP, the state has identified nine centers of aviation activity. Each center is called either a "Region" or "Metropolitan Area". A Region is an area containing several communities with common aviation ties to each other due to geographic and economic characteristics. A Metropolitan Area is a portion of the state with interrelationships between airports and a common economic base due to contiguous urban development. The CFASPP contains five aviation regions and four metropolitan areas. The statewide and nine regional CFASPP Steering Committees will guide the *FASP 2000* update after reviewing aviation activity forecasts, air transportation demands for each community, and a variety of working papers. Throughout this process, they help define roles for airports and development requirements to meet the total Florida air transportation demand. CFASPP Steering Committees are autonomous and are responsible for managing the twenty-year regional and metropolitan area aviation system plans from which the FASP is derived. The result of the *FASP 2000* effort will thus include the development of nine Regional Aviation Systems Plans, a statewide Summary, and a Strategic Plan. In addition to the extensive analyses and discussions concerning demand/capacity, airspace, forecast, surface access, facilities, etc., to be included in this effort, the *FASP 2000* Planning Component is envisioned to include an analysis and discussions of the: **(1)** a range of intermodal issues related to Florida's aviation industry; **(2)** rapidly expanding civilian flight training and related systems planning activity; **(3)** air cargo; **(4)** helicopter and vertical lift systems planning; and **(5)** the economic impacts of Florida's airports and airport projects on the local communities and the state. All of this effort combined with the participation of the CFASPP Steering Committees is envisioned to guide the dynamic and growing Florida aviation industry well into the next century.

6.l. The consortium recommends that the FLDOE provide funds to community colleges and/or vocational schools to market and promote awareness of their aviation and aerospace dual-enrollment programs.

6.m. The consortium recommends targeted industry sectors and schools become partners to make teachers more aware of industry opportunities. The Johnson Space Center program located in Houston, Texas is an example of industry partners providing professional development for middle school Math and Science teachers. This one-week program helps educators enhance their existing curriculums while promoting the aerospace industry to youth. The consortium further recommends that the Department of Education recruit local airports to partner with the middle and high schools to provide airport field trips and mentoring programs. Finally, the consortium recommends airlines at regional/international airports adopt low-income middle school and high schools in close proximity to the airport and provide an awareness of all the occupations provided by the airline.

6.n. The consortium recommends that CAP cadets provide briefings to middle and high schools about aviation and aerospace and for cadets who become mentors; they receive credit toward community service requirements for the Bright Futures scholarship.

6.o. The consortium recommends the FLDOE obtain interviews from aviation and aerospace employees and place these interviews in secondary and post-secondary periodicals such as the *Echoice Magazine*, *Florida Next* magazine, the *Florida Trend* magazine, *CollegeBound Teen* magazine, the *next STEP* magazine, and the *Road Ahead* magazine.

Section Seven

7. Finally, the consortium makes the following miscellaneous recommendations.

7.a. The consortium recommends that the Florida Department of Education (FLDOE) website be simplified. It is currently very difficult to find the various curriculum frameworks. These should be located on the site index under the keyword “frameworks.” From a drop-down window under frameworks should be elementary, secondary, vocational, and community college. Each of the buttons should list the frameworks in alphabetical order and program numerical order. The frameworks should be initially in Microsoft Word format so the framework website links can be accessed. This is not possible with an Adobe .pdf format.

7.b. The consortium recommends that FLDOE create a triple crowned high school diploma. This diploma would include the normal high school diploma requirements, and also include an industry certification/license requirement (such as an automobile mechanic certificate or Aviation and Powerplant Certificate) and the final requirement would be the state’s Gold Seal requirements. This type diploma would challenge most students and encourage a rigorous education and training program.

7.c. The consortium recommends that high school aviation and aerospace programs have secondary numbers that flow into post-secondary programs. This would be similar to the Virginia Peninsula Vocational Program (discussed in Section Five) that has a flowed educational program from grades nine through fourteen for specific occupational tracks.

7.d. The consortium recommends a standardized articulation agreement at the secondary to community college level, community college level to university level, and university to university level be put on the FLDOE website for use by academic institutions. Examples are located in Attachment Five.

7e. The consortium recommends a Home School button be put on the FLDOE website with information/links about the Enterprise Florida, Incorporated (EFI) five strategic sectors.

7f. The consortium recommends the FLDOE Industrial Education Office create a separate division to cover just the Enterprise Florida, Incorporated (EFI) five strategic sectors’ educational programs. If the sectors are truly strategic, educational frameworks and curriculum must be refreshed more frequently to ensure the state education system is providing the most current and capable workforce for these vital industries.

Section Eight

The last section provides six aviation and aerospace career descriptions with general information about opportunities in Florida and the nation.

The specific occupations are: Airline Pilot
Air Traffic Controller
Aviation Mechanic
Aviation/Aerospace Electrician
Airfield Transportation Manager
Aerospace Engineer

This information can be copied to a compact disk and distributed to middle and high school career counselors so they can pass this information on to interested students.