



**North Texas Aviation Education Initiative**  
North Central Texas Council of Governments

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## **A Summary of Literature including Existing National and Regional Gap Analyses**

June 2009



## A SUMMARY OF LITERATURE INCLUDING EXISTING NATIONAL AND REGIONAL GAP ANALYSES

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<b>Appendix A</b>	List of Articles Reviewed
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## A. GLOSSARY

This section defines acronyms and abbreviations used throughout the document.

<b>Term</b>	<b>Description</b>
A&P	Airframe and Powerplant
AAAE	American Association of Airport Executives
AABI	Aviation Accreditation Board International
ADD	Aviation Documents Delineator
AERO	Aviation Education Reinforcement Option
AVM	Aviation Management
AVMAF	Aviation Management and Flight
B.A.	Bachelor's of Arts
CAA	Council on Aviation Accreditation
CogScreen-AE	CogScreen- Aeromedical Edition
CPT-II	Connors Continuous Performance Test, 2 <sup>nd</sup> Edition
CSA	Commercial Service Airport
ERAU	Embry Riddle Aeronautical University
FAA	Federal Aviation Administration
FBO	Fixed-Base Operator
GIS	Geographic Information System
GPA	Grade Point Average
GPS	Global Positioning System
ISU	Indiana State University
KSA	Knowledge, Skills, and Abilities
KTS	Keirsey Temperament Sorter
LTM	Learning Type Measure
MAS	Master of Aeronautical Science
MPA	Master of Public Administration
MSTM	Master of Science in Technical Management
NCTCOG	North Central Texas Council of Governments
PCATD	Personal Computer-based Aviation Training Device
ROI	Return of Investment
SIUC	Southern Illinois University Carbondale
SPSS	Statistical Package for the Social Sciences
System Plan	Regional General Aviation Airport and Heliport System Plan
TAA	Technologically Advanced Aircraft
TRB	Transportation Research Board
TRIS	Transportation Research Information Service
TTI	Texas Transportation Institute
UAA	University Aviation Association
WBL	Work-Based Learning

## B. INTRODUCTION

The North Texas Aviation Education Initiative: Development and Implementation (Education Initiative) is a study by the North Central Texas Council of Governments (NCTCOG) that will result in a comprehensive plan to strengthen the educational opportunities in aviation as well as to promote these opportunities to the general public. NCTCOG's goal is to help keep talented young people in the region by providing academic opportunities in which they can excel and gain the training necessary to be successful in aviation careers. Extensive research and analysis is necessary to develop an integrated education program.

The first part of the Education Initiative is a summary of literature, including existing national and regional gap analyses, that provides the basic foundation for the study. The national study, dated 2007, was authored by Dr. David A. Byers and the regional study, dated 2003, was authored by Dr. Jeffrey D. Borowiec. Both individuals are on the consulting team for this initiative, and they reviewed their respective works for this summary. Also, a review of additional seminal works was done.

The review of these documents, as with the articles that follow, provide the team with additional resources and insight that will be utilized in the development of future deliverables notably the *Strategic Business Plan*. As with the articles that follow, some of the summary information provided here is taken from the original documents themselves to ensure capturing both its original intent and accuracy.

## C. REVIEW OF NATIONAL GAP ANALYSIS

1. J.D. Borowiec, Aviation in Higher Education: The Development of a Comprehensive Aviation Management and Commercial Pilot Program in Texas (College Station, Texas: Texas Transportation Institute, Texas A&M University System, August 2003)

This document marks the first statewide effort to identify existing aviation programs in Texas and highlight the notable lack of aviation higher education resources in North Texas despite it being a regional economic hub for aviation-related business and employment. This report serves as the genesis for the pursuit of additional aviation higher education resources in the State. It lays the foundation for future analysis to be conducted and built upon.

As noted in the document itself...

"Texas does not currently have a college or university that offers a comprehensive four-year degree curriculum for students interested in pursuing careers in aviation/airport management or as a commercial pilot. As also noted, these programs are available at numerous publicly owned universities across the country. This includes the bordering states of Louisiana and Oklahoma. While there are two-year associate degree programs available at a few of Texas' junior colleges, these career opportunities are not available to Texas students at any in-state university. This is potentially problematic as many professional positions in aviation/airport management as well as positions for professional and commercial pilots require a four-year college degree. Many of the jobs in aviation, both management and flying jobs, requiring specialized aviation skills and knowledge are with companies based in Texas."

The report develops the background information needed for a publicly owned, four-year university to evaluate the feasibility of and to apply for approval and funding of a four-year aviation degree program in Texas that included both aviation/airport management and commercial pilot curriculums. The report also examines the aviation-related programs currently offered in Texas, Oklahoma, and Louisiana. The research team made visits and conducted phone interviews with several aviation programs and collected a variety of information including program mission and objectives, curriculum and courses offered, the number of students and the supporting faculty and staff, job placement programs, program facilities, equipment and airplanes, administrative and operational structures of the programs, and the costs involved in operating the various programs.

Additionally, the report examines the policies and criteria established by the State of Texas Higher Education Coordinating Board for the development and approval of new programs. New program proposal and approval criteria as well as examples of new program proposals were studied.

The report includes a generic program or curriculum containing all the essential components of an aviation program that includes both management and flight options. The report also includes the results of inquiries placed to numerous Texas universities seeking input on their interest in developing such an aviation program.

Since the publication of this report, there are some changes that have occurred. These revolve around the four-year degree programs. First, Tarleton State University, having reached its enrollment requirements, has become Texas A&M University – Central Texas (Killeen). It continues to have an aviation science program and only one full-time tenure-track faculty member. It serves as a bachelor's degree finishing program for students who have completed flight training at other colleges. It has matriculation agreements with four two-year schools including the proximally located Central Texas College. The school continues to place students in a variety of internship programs both in management and flight positions. Additionally, the single faculty member has earned a doctorate degree.

Perhaps the biggest changes have occurred at Texas Southern University; both the university and aviation program have undergone management changes. The aviation program continues to have two full-time faculty, and the new director holds an earned doctorate. The program enjoys some new found support from the administration and has recaptured internal funding previously used by other departmental entities. The program has good prospects of becoming a separate academic entity from the Texas Department of Transportation Studies which it falls under today. The new director has made several improvements to the program including the addition of a flight component and related coursework. The program has added eight new courses in the last few years and these are attributed to the flight portion of the program. They have purchased two new aircraft for use in the new flight program and have added new flight simulators for training. Details of the flight program in terms of its location (airport), structure (contract/in-house), enrollment numbers, and costs are still emerging. Clearly, the university has realized the significance of adding the flight option to its program, underscoring the need to train pilots for the future.

An additional change in aviation higher education is occurring in North Texas and is, perhaps, a direct result of the TTI Report and NCTCOG's efforts to highlight the need for aviation education resources in the state and region. The University of North Texas, the only university to acknowledge interest in an aviation program in the 2003 TTI Report, has made progress in the development of an innovative aviation degree program. The university, at its Denton Campus, has developed a program in aviation logistics. The program is located in the College of Business where the Center for Logistics Education and Research is also housed. The provost has signed off on the program and it was approved May 2009 by the university's Board of Regents. Then it is to go to the Texas Higher Education Coordinating Board for approval.

The degree would be a B.A. in Aviation Logistics and it is planned for a Fall 2010 start. In addition, there is a newly formed Student Aviation Association to facilitate academic/industry activities. The professors responsible for developing this new program have noted the need for professionals in this field. The region is home to several major aviation companies such as Lockheed Martin, Southwest Airlines, American Airlines and Bell Helicopter. With all of them based in North Texas, there is a need for professionals in the immediate area. Additionally, the professors stated that students in the program could seek work as commercial pilots, airport directors and even Air Force pilots.

2. D.A. Byers and CHA Aviation Development Team, New Technologies and Industry Trends Report, prepared for the North Central Texas Council of Governments (Dallas, Texas: 2007).

The New Technologies and Trends Report was prepared as part of a larger study, the Regional General Aviation Airport and Heliport System Plan (System Plan) commissioned by NCTCOG. In the evaluation of trends that could affect the future of aviation as a whole and specifically for the region, the subject of aviation labor needs was considered. This Trends Report cited the 2003 TTI report as a foundational document identifying the need to further investigate the feasibility of developing a four-year aviation academic program at a public university for the State of Texas, since none currently exist. As a forward looking study, the Trends Report focused on the increasing demand for managerial personnel and skilled labor to serve the varied aviation interests in the state and the limitations of the existing educational network. The Trends Report suggests that establishing a public four-year collegiate aviation program in North Texas should be a critical concern to its constituents, both residents and the aviation industry alike, if the state is to maintain its preeminent leadership position in the global marketplace.

The Trends Report recognizes that the need to develop a coordinated and comprehensive regional aviation curriculum to support the need for additional aviation workforce is being addressed by NCTCOG through the sponsorship of an Aviation Curriculum Development Study. This proposed study is being designed to review gaps identified by the 2003 TTI study and the System Plan (2007). A regional industry labor needs and supply evaluation would also be conducted to compare existing academic programs to existing and future industry needs within the region and would specifically include pilots, air traffic controllers, mechanics, airport managers, dispatchers, and others aviation specialties. The study would also outline the development of an implementation plan, degree options, internship opportunities, and professional certifications and licenses for the recommended aviation curriculum.

## **Other Key Documents**

1. Texas Comptroller of Public Accounts, Texas Works: Training and Education for all Texans (Austin, Texas: December 2008)

This analysis, published by the Texas Comptroller of Public Accounts, highlights the current pending shortage of skilled technical workers in the state. The study focuses on the need for creating educational pathways for skilled and technical workers that do not require bachelor's degrees to earn above-average paying jobs. It notes that many high-paying and growing professions are available to persons with technical and skilled training. Currently, the state's publicly funded higher education institutions are not meeting this demand for a skilled workforce. In 2007, Texas had approximately 44,000 job openings for workers with some postsecondary technical or career training. The state only produced 36,442 students with the skills required for those jobs. In contrast to this, the state produced more bachelor's, master's and doctoral graduates from its public universities than could be absorbed in the economy. The report notes that private institutions provide a large number of graduates in the needed areas, helping to alleviate the shortage.

Moving forward, the U.S. Department of Education predicts that the vast majority of the growing job professions in the country will require some postsecondary training but will not require a bachelor's degree. With so much attention placed on pushing students into four-year programs and the growing need for a skilled jobs that do not require such, focus is being placed on addressing this challenge to meet the workforce needs in the future.

The report identifies numerous professions, their median earnings, and an estimate of the current number of jobs in the field. Among these categories are avionics technicians and aircraft/service technicians. Drop-offs in vocational education enrollment and the impending retirement of the baby boom generation workers will only exacerbate this need. The report addresses career and technical education issues, work force programs and pathways to careers and employment for these students beginning in the high schools.

The report includes several recommendations to overcome the challenges associated with getting more students into skilled and technical education programs. The appendix includes detailed profiles of the community and technical colleges in the state that are expected to play a role in addressing these workforce needs.

2. Texas Higher Education Coordinating Board, Closing the Gaps: The Texas Higher Education Plan, (Austin, Texas: 2005)

In this report's executive summary, it is noted that Texas is profiting from a diverse, vibrant and growing economy. Yet, this prosperity could turn to crisis if steps are not taken quickly to ensure an educated population and workforce for the future. At present, the proportion of Texans enrolled in higher education is declining. Too few higher education programs are noted for excellence and too few higher education research efforts have reached their full potential. Texas must take bold steps for the future success of its people. This higher education plan outlines the goals of closing the gaps in higher education participation and success, in educational excellence, and in funded research over the next 15 years. It is by no means a list of all desirable actions in Texas higher education, but rather outlines the four challenges which are the most critical to overcome.

This analysis documents the existing educational gaps and prescribes strategies for closing them. Its focus is on a resultant increase in college and university enrollment to benefit both individuals and society to increase employment opportunities and satisfaction. The intent is to build enrollment to keep pace with the Texas population, prevent a less-educated workforce, and support the growing state economy.

#### **Additional Materials Reviewed by Project Team**

- North Central Texas Council of Governments, The Need for Coordinated Aviation Curriculum Study in North Central Texas, (Arlington, Texas, December 2008).
- Novacek, Paul, "NCATT Part I: Earning Avionics Technician Certification," Avionics News, March 2009, 42-46.
- Novacek, Paul, "NCATT Part II: The Shop's View of NCATT Certification and Hiring Technicians," Avionics News, April 2009, 52-54.
- PowerPoint Presentation from Beau Williamson
- Table of Existing Aviation Programs in the State
- Transportation Research Board, "The Workforce Challenge: Recruiting, Training, and Retaining Qualified Workers for Transportation and Transit Agencies," (Washington, DC, June 30, 2003, Special Report 275).

#### **D. PEER-REVIEWED LITERATURE SEARCH/REVIEW**

The literature review in this document takes the form of an annotated bibliography. The references are grouped according to specific categories and an abstract of the research is included to provide an understanding of the work and insight into its future usefulness in this project.

The literature search that identified these works made use of the Transportation Research Information Service (TRIS) database. This database is funded by sponsors of the Transportation Research Board (TRB) which primarily include state and federal transportation agencies. It includes more than 500,000 published transportation-related research articles.

An additional search using the TRANSPORT database was also performed. The materials of interest that resulted from this search were included in the earlier TRIS search. The TRANSPORT database is also, in part, produced by the TRB. More than 250 records were reviewed as part of this effort.

The consultant team also utilized the ProQuest database used to maintain records, of university theses and dissertations. The team identified numerous dissertations of interest and these are included in the literature review as well. Approximately 40 dissertations were reviewed as part of this effort.

The literature review identified materially relevant information that offers significant insight into how formal higher education programs in aviation can be organized, operated, and improved. These resources will be valuable to the team going forward especially as it evaluates regional needs, recommends an expanded, coordinated and comprehensive regional aviation curriculum, and develops the critical *Strategic Business Plan* designed to move the aviation program into implementation.

The bulk of the aviation education research articles are from peer-reviewed articles. This is significant in that they carry more weight in the academic community. The mere existence of these publications lends credence to aviation as a legitimate academic discipline. The research included in peer-reviewed journals is more widely-accepted due to the rigorous review process that it must go through. It should be noted that the primary source of academic aviation material retrieved for this effort is from the *Collegiate Aviation Review* and the *Journal of Air Transportation*. Specific searches of these publications were made to ensure a comprehensive approach to finding material in what emerged as the two primary sources.

The literature review is provided in annotated bibliography format organized by topic area. This approach allows its users to know what research has been done in what areas and allows users to quickly assess the value and usefulness of the completed works.

The annotated bibliography focuses on research relating to the development of a four-year aviation program. This includes literature supporting the development of such programs and their relationship to two-year schools/colleges. The consultant team was particularly interested in documents supporting higher education programs as opposed to vocational education programs and the connections and pathways from two-year schools to four-year programs.

The categories used in this annotated bibliography include:

- Aviation Education – General: includes articles that provide holistic perspectives on adaption higher education, basic aviation program interests and issues, and other material that would not otherwise fit in the other categories;
- Aviation Education – Curriculum: includes articles and other materials that address general or specific curriculum and course issues necessary for responding to course accreditation standards, industry requirements and evolutionary trends in the aviation industry;
- Aviation Program Development and Assessment – includes research conducted to address issues regarding the quality of aviation program curricula and aviation course material;
- Career/Employment Pathway Development – includes material related to issues related to students' transition into relevant aviation industry career paths;
- Aviation Program Recruitment and Retention – includes research related to how students become interested in collegiate aviation education and issues regarding retaining students, and;
- Aviation Education Content Delivery and Enhancements – includes research on the effectiveness of innovative methods and means for enhancing conducting aviation-related courses.

The abstracts included in the annotated bibliographies were taken directly from the referenced articles and serves to provide a brief statement on the research methods and the findings relevant to this analysis. In some cases the abstracts from the articles were directly included either wholly or in part. It should be noted that this bibliography does not include documents or articles from general news sources. While these can be informative in many respects, they are typically not included in literature reviews which mostly have a more stringent requirement for inclusion.

### **Aviation Education – General**

1. R. Troy Allen and Harry E. Minniear, "Factors Influencing a Decision to Pursue a Degree in Aerospace Technology," Collegiate Aviation Review, vol. 25, no. 2 (2007).

This research was completed in order to identify factors that influence a student's decision-making process when deciding to enroll in the Aerospace Program at Indiana State University. Many research studies have identified factors that influence a student's decision process when choosing between universities. However, very little research dealt with the factors that influence the decision-making process of a student when selecting a collegiate aviation program. A convenience sampling was taken of 133 students who were completing a degree in aerospace administration or professional piloting. Nineteen different factors were ranked in descending order of mean value. They are: speed to attain flight certificates; tuition; quality of facilities; personal attention; faculty to student ratio; flight simulators; time to completion of degree; flight fees; department representative; ROI; faculty qualifications; admittance requirements; university representative; location of college; financial aid; accept previous flight time; graduate recommendation; accept previous college credit; and parent. Additionally an independent sample one-way analysis of variance was completed to identify any statistically significant differences between the two aerospace majors.

2. L.E. Ruiz, "Perceptions of Communications Training Among Collegiate Aviation Flight Educators," Journal of Air Transportation, vol. 9, no. 1 (2004).

This paper reports on the opinions of educators regarding communication training in University Aviation Association (UAA) member collegiate aviation flight programs. Educators representing 37 UAA member flight programs indicated their levels of agreement with a battery of statements regarding communication training on a five-point Likert scale. Chi square and Mann-Whitney analysis of responses indicates that these educators agree on the importance of communication skills, the purpose of written assignments, and their institution's preparation of students to communicate effectively in industry. Opinions are more varied regarding the integration of more communication assignments and the willingness of institutions to compensate those instructors who choose to incorporate such assignments.

3. Jeffrey Bruce Summey, Marian C. Schultz and James T. Schultz, "Are Four-Year Universities Better than Two-Year Colleges at Preparing Students to Pass the FAA Aircraft Mechanic Certification Written Examinations?," Journal of Air Transportation, vol. 9, Issue 1 (2004).

This study evaluates differences between two-year and four-year schools offering a Federal Aviation Administration (FAA) Part 147 aviation maintenance technician program. The actual average test scores were analyzed to determine whether students from four-year university programs were better prepared for the test than students from two-year college or technical school programs. Test scores can be viewed as a direct indication of the quality of the aviation maintenance programs at these schools. The study found that there was no statistically significant difference in the test scores between two-year college and four-year university students taking the FAA examinations. These results support previous studies that found the learning outcomes of two-year and four-year students on general subjects to be comparable.

4. C. Daniel Prather, "Post-secondary Aviation Education: Preparing Students to Manage Airports of the 21<sup>st</sup> Century," Collegiate Aviation Review, (Fall Education Conference of the University Aviation Association September 1998), pp. 40-61.

The author, an airport executive as noted above, presents findings on the views of airport managers across the country regarding the most appropriate fields of study, aviation courses, and academic degrees for preparing for a career in airport management. The author randomly surveyed 200 airport managers from the 1996-1997 directory of the American Association of Airport Executives (AAAE). A 66 percent response rate was achieved. The author found that the top five fields and the percent that rated them as important or extremely important by the airport managers were management (100%), aviation management (89%), public administration (86%), marketing (85%), and finance (84%).

In terms of academic degrees, 50 percent of the respondents have completed a bachelor's degree and 29 percent have completed a master's degree. Sixty-seven percent of the respondents feel that a bachelor's degree is the highest degree preferred by an employer. Twenty-nine percent believe that a master's degree is preferred. As for academic courses, the author found that the most important courses offered in an aviation management curriculum were, in order of importance, as follows: airport administration, airport finance, aviation policy and planning, aviation safety, aviation marketing, aviation law and regulation, aviation communication, air transportation, aviation insurance, and aviation labor relations.

The least important were: international aviation, principles of transportation, and private pilot ground school. The author notes that women are disproportionately under-represented in airport management. He also notes that universities should increase marketing efforts towards aviation students, consider offering a master's degree program in aviation to further educate students about the complexities of the industry, seek accreditation from the Council on Aviation Accreditation (CAA), and not to assume that aviation programs alone are educating future airport managers.

5. Robert W. Kaps and Leland L. Widick, "Educational Requirements for a Career in Airport Management: An Industry Perspective," Journal of Studies in Technical Careers, vol. 15, no. 3 (1995), pp. 153-161.

The authors surveyed airport managers at the top 25 airports in the United States regarding the educational preparation of students seeking careers as airport managers. The managers were asked to rate 26 courses as being required, optional, or not necessary. The consensus was that management courses were the most important. Courses in financial management, airport operations, aviation regulations, introduction to management, personnel administration, and

macroeconomics were highly regarded. Courses in data interpretation, airline management, aviation maintenance management, an internship component and a pilot's license were ranked low in importance. The authors note that the field of airport management is complex and dynamic and growing more so every day. This is being driven by emerging technological, economic, and political realities.

6. Lawrence J. Truitt, John A. Haman, and Laus G. Palinkas, "Graduate Education in Airport Administration: Preparing Airport Managers for the 21<sup>st</sup> Century," The Journal of Aviation/Aerospace Education and Research, vol. 2, (1994), pp. 9-16.

The authors surveyed members of the AAAE to identify the knowledge and skills that the next generation of airport administrators will need to effectively run airports. The article discusses how aviation education is adapting to meet the coming challenges. The article focuses on the master of public administration (MPA) degree with a concentration in aviation management and uses it as the basis of discussion. The respondents felt that all of the MPA courses were relevant. Courses in public budgeting and fiscal management ranked the highest followed by public personnel management and the environment of public administration. Of the aviation courses in the curriculum, airport administration ranked the highest followed by aviation safety administration, aviation law and regulation, and aviation policy and planning.

The managers were also asked to recommend courses for the aviation administration concentration. The recommendations were for adding courses including law and regulations (environmental), communication skills and marketing, contract administration, civil engineering, operations, economics, and miscellaneous administrative skills. The airport managers heavily favored courses with practical applications.

7. Robert W. Kaps and Jose R. Ruiz, "Educational Requirements for a Career in Airline Management: An Industry Perspective," Collegiate Aviation Review, (Fall Education Conference of the University Aviation Association September 1997), pp. 43-57.

In this study, the presidents at thirty of the top U.S. airlines were asked to indicate what educational preparation they felt students seeking a career in airline management should possess. They were asked to rate 18 courses offered in the Aviation Management baccalaureate degree curriculum at Southern Illinois University at Carbondale. They were also asked to rank 14 suggested courses from the CAA curriculum guide. Following analysis, courses were placed in three categories: Inclusionary, Exclusionary, and Uncertain/Divers.

Findings indicate that airline presidents place the greatest value on courses stressing fiscal requirements, legal aspects, airline operations and operating in a global environment. Conversely, courses including Applications of Technical Information, National Airspace System, Airport Planning, Airport Management, Professional Development and General Aviation Operations were ranked low in importance.

8. Michelle Fuller and Lawrence J. Truitt, "Aviation Education: Perceptions of Airport Consultant," Journal of Air Transportation Worldwide, vol. 2, no. 1 (1997), pp. 64-80.

The necessity for advanced training in aviation has prompted a few universities to establish graduate programs in aviation. Although several masters aviation programs are now well established, they do not have a common core curriculum. This article reports the findings of a study designed to learn more about the education needs of one segment of the aviation industry—the airport consulting business. Airport consultants were first asked to evaluate the

relevance of courses offered in an existing MPA program. They were then asked to evaluate 16 fields of academic study in terms of importance in preparing entry-level employees for a career in airport consulting.

9. M.R. Karp, "University Aviation Education: an Integrated Model," Collegiate Aviation Review, vol. 18, no. 1 (October 2000), pp. 1-11.

As indicated at the Regional Air Transport Training Convention and Tradeshow (RATS 2000) at Daytona Beach, FL, on February 8-9, 2000, the U.S. regional airlines fully recognize that the frequently-discussed shortage of regional airline pilots is now a fact rather than a forecast. The regional airline conference attendees also felt that potential pilot shortages in the major airlines are probably not far behind. Over the past few decades, the airline industry has relied upon the military for its primary source of experienced pilots. However, with increased commercial airline expansion, coupled with the Vietnam era trained pilots approaching retirement age and the recent low military pilot training production, the United States now faces a shortage of highly experienced pilots in both the military and the commercial airline industry. While flight programs have been developed to meet these shortfalls with increased training, consideration should also be given to improving the aviation education process itself, which is the foundation of flight training. University aviation training programs, because of their comprehensive academic environments, offer excellent opportunities to develop and deliver state-of-the-art aviation curricula and become the new primary resource for commercial airline pilots. A key question to help resolve the impact of the commercial pilot shortage should be: Can an enhanced aviation academic education and flight training program help accelerate university-trained pilots into airline cockpits? This paper draws upon research conducted in the Aeronautical Management Technology Department at Arizona State University (Karp, 1996) and addresses potential educational enhancements through the implementation of an integrated aviation learning model, the Aviation Education Reinforcement Option (AERO). The AERO model is a learning strategy that incorporates elements of the adult education paradigm, learning style theory, cooperative and collaborative learning techniques, and personal computer-based aviation training devices (PCATDs), to span the long-term retention and application gap that can occur between the classroom and the flight line. This paper suggests that the AERO model, when combined with flight training that emphasizes airline procedures from the very beginning, has the potential to reduce the pilot training time required between the universities' academic classrooms and flight training environments, and the commercial airline cockpit.

10. P.R. Dammier, (2007), "Analysis of decision-making qualities between aviation and non-aviation graduate students on the Keirsey Temperament Sorter," UMI No. AAT 3259293.

This study analyzed the differences of decision-making behavior between aviation and non-aviation graduate students. Aviation professionals and previous researchers have primarily been concerned with the identification of improving technology. Recent research resulted in an additional area of interest focused on addressing how decisions are made in high-risk aviation environments. This quantitative research studied aviation and non-aviation subjects and analyzed the verbal behavior identified from the choices made on a personality test. The literature supported the perception that verbal statements are the result of an individual's thought processes and the collection of environmental causes that may be used to understand behavior. The Keirsey Temperament Sorter (KTS) (Alpine Media Corporation, 2003) provided a numerical score for factors such as thinking versus feeling and judging versus perceiving with replicable operational outcomes. A Multiple Analysis of Variance, with Grade Point Average (GPA) as a covariate was performed.

The dependent variable scores on the KTS scales of Feeling, Thinking, Judging, and Perception were analyzed to determine whether any significant differences existed between the Master of Aeronautical Science (MAS) and Master of Science in Technical Management (MSTM) groups. A significant difference on the scale of Thinking and Judging was found for the MSTM group but not for the MAS group. The Embry-Riddle Aeronautical University graduates of the MAS and the MSTM programs demonstrated a significant difference on personality test scores that may confirm that decision-making skills are a part of their program's learning outcomes. The data in this study appears to indicate that at least two factors external to the school in the study contribute to higher success in aviation training: 1) students who are made aware of aviation as a career earlier are more likely to succeed in their training; and, 2) students who had either friends or family in aviation who could explain what a career in aviation consisted of were more likely to succeed. Students who were well informed were more likely to have career goals that would allow them to be integrated into the program, and the school, of their choice. These students were apparently better prepared to deal with the problems they encountered in school because they understood how their experiences in school would help them reach their career goals.

### **Aviation Education – Curriculum**

1. Robert I. Aceves and Patricia A. Aceves, "Preparing Aviators for the 21st Century: A 3-Year Case Study of Service Learning in the Aviation Classroom," Collegiate Aviation Review, vol. 26, no. 1 (2008).

This three-year qualitative case study of service learning in undergraduate aviation classes measures the affective domain learning outcomes of required service learning projects versus optional service learning projects. A literature review on democratic citizenship suggests a gap in learning materials available to help students become responsible and engaged citizens. Development of the service learning component is described, including critical thinking, problem solving, and developing a clear connection between the course objectives and service activities. The study details three measured outcomes of the affective domain: receiving, responding and valuing. Three semesters of required set-vice learning activities are compared with three semesters of optional service learning activities using descriptive statistics and chi-square analysis. Findings indicate that when service learning is required, students respond at a significantly higher rate than when the service learning is optional. However, students who voluntarily completed the optional activities were found to value the experience to a greater extent than students who were required to complete the projects.

2. Randy Johnson, Ray Hamilton, Brian Gibson, and Joe Hanna, "Usefulness of Collegiate Aviation Publications: What Aviation Educators Say," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 82-100.

Evaluations of referenced research journals typically target their quality. Because of the hybrid nature of aviation education as a discipline and its orientation toward applied research, this research expands the scope of the evaluation process to encompass professional publications that address practitioner interests and focuses on three educational areas: 1) quality; 2) contribution to the discipline; and, 3) relevance to ongoing research. Thirty-one out of 205 aviation educators queried responded to the survey by selecting and assessing periodicals pertinent to the discipline. One trade journal, *Aviation Week and Space Technology*, and four peer-refereed journals, the *Collegiate Aviation Review*, the *Journal of Air Transportation*, *International Journal of Applied Aviation Studies*, and the *Journal of Aviation and Aerospace*

*Education and Research* achieved the highest composite scores based on analysis of the survey responses.

3. D. Scott Worrells, and John K. Voges, "The Role and Function of Work-based Learning in Aviation Management Programs," Collegiate Aviation Review, vol. 25, no. 2 (2007).

Work-based learning (WBL) encompasses various and diverse components of experiential learning. Cooperative education and internship comprise two elements of experiential learning constituting WBL in this study. The importance of WBL is amplified by an aviation industry that identifies "job skill and knowledge" as "highly regarded" characteristics of new hires (Phillips, Ruiz, & Mehta, 2006, p. 126). The study sets out to define the roles and functions of WBL and determine their overall importance from the perspective of those that are engaged in administrating and managing WBL activities in Aviation Management (AVM) programs.

4. Dale B. Oderman, "Ethics Education in University Aviation Management Programs in the U.S.: part three – Qualitative Analysis and Recommendations," Journal of Air Transportation, vol. 9, Issue 1 (2004).

This three-part study examines how four-year U.S. universities with baccalaureate programs in aviation management include ethics instruction in their curricula. Part One justifies the need for ethics education and develops hypotheses to evaluate the status of ethics instruction. Statistical tests in Parts Two A and Two B established that ethics is not widely included in aviation curricula. Part Three continues by probing for deeper understanding of current practice. It was found that little is being done to increase ethics instruction, as no sense of urgency exists to bring about change. Recommendations to improve ethics coverage include proactive involvement of those currently interested in the subject, cooperative relationships between academia and the aviation industry, and a phased program to increase the level of ethics inclusion in aviation curricula. Ideas for future study are suggested.

5. S. M. Quilty, "Airport Management Program and Curriculum Issues at 2- and 4-year Aviation Colleges and Universities," Collegiate Aviation Review, vol. 22, vo. 1 (October 2004), pp. 57-70.

The majority of aviation related education programs at U.S. colleges and universities focus on flight education and training. These flight education programs and curricula have been developed over time and within the regulatory constructs of Title 14 Code of Federal Regulations Parts 61, 141, 145 and others. Not as well developed are curricula and goals for student outcomes related to airport management and operations, or aviation management programs in general. This paper presents and outlines issues as they relate to the development of an airport/aviation management curriculum for two- and four- year post secondary education institutions and promotes discussion on these issues in light of practical and accreditation constraints.

6. Richard K. Snow and Mary M. Snow, "Advanced Aviation and Aerospace GIS: course Development and Curriculum Expansion," Journal of Air Transportation, vol. 9, no. 3 (2004).

Embry-Riddle Aeronautical University recently began offering the highly successful Introduction to Geographic Information Systems course to its students, and subsequent geographic information system (GIS) courses are being developed. The objectives of additional GIS coursework include the integration of high technology computer techniques and laboratory exercises, providing collaborative learning opportunities to improve pedagogy, and

implementing model practices and materials. As an effective instrument for visualizing tabular data, recognizing emergent patterns, and graphically depicting results, GIS enhances student learning by adding a hands-on component while supplementing existing research methods. This paper examines GIS course development and curriculum expansion within the realm of aviation and aerospace.

7. Stephen M. Quilty, "Study Results on Knowledge Requirements for Entry-Level Airport Operations and Management Personnel," Journal of Air Transportation, vol. 10, Issue 3 (2005).

This paper identifies important topical knowledge areas required of individuals employed in airport operations and management positions. A total of 116 airport managers and airfield operations personnel responded to a survey that sought to identify the importance of various subject matter for entry level airport operations personnel. The results from this study add to the body of research on aviation management curriculum development and can be used to better develop university curriculum and supplemental training focused on airport management and operations. Recommendations are made for specialized airport courses within aviation management programs. Further, this study identifies for job seekers or individuals employed in entry level positions those knowledge requirements deemed important by airport managers and operations personnel at different sized airports.

8. Dale B.Oderman, "Ethics Education in University Aviation Management Programs in the U.S.: Part Two B – Statistical Analysis of Current Practice," Journal of Air Transportation, vol. 8, no. 2 (2003).

This three-part study examines how four-year universities in the U.S. with baccalaureate programs in aviation management include ethics instruction in their curricula. Part One justified the need for ethics education and developed hypotheses to evaluate the current status of ethics instruction. Part Two of the study continued with a quantitative analysis of an extensive survey of all collegiate aviation management department heads. Survey data reported in Part Two A revealed that ethics is not widely included in collegiate aviation programs at levels expected in light of current industry problems. Part Two B of the study shows that as predicted, strong department head support for ethics instruction and active department head involvement in teaching ethics led to higher levels of planned ethics inclusion. Faculty interest was a second influential characteristic.

9. Beth M. Beaudin-Seiler, Jeffrey M. Beaubien and Ryan C. Seiler, "Collegiate Flight Training: Making Progress in the Face of Adverse Conditions," International Journal of Applied Aviation Studies, vol. 8, no. 2 (2008).

This paper describes the approach that one flight program took to better track the progress of its student pilots. The project's goals were to identify the effects of training gaps, evaluate the number of semesters to complete a private pilot certificate, evaluate the quality of instruction provided to students, determine when students should be flagged for lack of progress, and suggest remediation strategies. Multiple regression analysis was used to assess the effects of training gaps and instructor quality on the number of semesters required to complete the private pilot's certificate. Results show that gaps in training explain significant criterion variance even when controlling for other relevant variables. Newly developed tools, such as the Gaps in Instruction Adjustment Matrix, may help to standardize the administrative decisions concerning the amount of remedial training required following a gap in instruction.

10. Dale B. Oderman, "Ethics Education in University Aviation Management Programs in the U.S.: Part Two A—The Current Status," Journal of Air Transportation, vol. 8, no. 1 (2003), pp. 15-36.

This article presents the second part of a three-part study that examines how four-year universities in the United States with baccalaureate programs in aviation management include ethics instruction in their curricula. Part One justified the need for ethics education and developed hypotheses to evaluate the current status of ethics instruction. Part Two of the study continues with an extensive survey conducted in 2000 of all collegiate aviation management department heads. Part Two A, the first of two reports on the results of the survey, describes the current status of teaching ethics in the nation's aviation management education programs. It was found that ethics is not widely included in collegiate aviation programs at levels expected in light of current industry problems.

11. Dale B. Oderman, "Ethics Education in University Aviation Management Programs in the U.S.: Part One—The Need," Journal of Air Transportation, vol. 7, no. 3 (2002), pp. 3-32.

This study is the first part of a three-part study that examines how four-year universities in the United States with baccalaureate programs in aviation management include ethics instruction in their curricula. Based on a literature review, no research exists to describe the current status of teaching ethics to aviation students. Yet, concurrently, unethical activities reported in the media involving the aviation industry indicates a need for such programs. Part One of this study justifies the need for ethics education and develops a series of hypotheses to evaluate the current status of ethics instruction, which was investigated and is reported in Parts Two and Three of this study, respectively (from abstract).

12. A.D. Langley, (2007), "A qualitative inquiry of stakeholder recommendations for collegiate aviation security curricula," UMI No. AAT 3291449.

The current world environment and the challenges of the future demand an efficient and effective aviation security system. Development of intellectual capital to support that system must be based on strong academic curricula grounded in the life experiences and academic pursuits of its current stakeholders across three distinct disciplines: security, aviation and

education. The purpose of this study was to develop a set of stakeholder driven recommendations for aviation security certification, degree programs, and specific curricula. Three broad research questions supported the findings of this study related to stakeholder recommended skill sets, core knowledge bases, and specific course work for collegiate aviation security programs. A purposive sample of 14 stakeholders from a variety of international aviation security professions was selected for interview using an Interview Guide of 16 questions. The data was analyzed using Hyper-Research software. Connections were made between common disciplines, themes, and linkages. Skills sets predominantly identified by the majority of stakeholders fell into one of three broad categories: thinking, communication, or relationship skills. Recurring themes in the study surfaced the importance of incorporating risk management, interpersonal communications, business concepts, global perspectives, cultural studies, and analytical thinking not only to degree programs but to be woven into the fabric of specific coursework.

Program design considerations which surfaced in the study included: flexibility to maintain currency in the industry; accessibility through online, distance learning and hybrid course formats; and lifelong learning or continuing education components to keep certificates and degrees current in a rapidly changing field. Recommendations of the study were based on growth in projected demand and included three Langley models: Aviation Security Certification Program, Aviation Security Bachelor of Science Degree; and the Aviation Security Master of Science Degree Program. A number of additional recommendations were offered based on stakeholder comments related to funding, grants, and future research.

### **Aviation Program Development and Assessment**

1. Raymond Allen Hamilton II, Wesley S. Randall and Joe B Hanna, "Aviation Management: A Discipline in Crisis?," Collegiate Aviation Review, vol.26, no. 2 (2008).

This article presents a detailed description of the key attributes of undergraduate aviation management programs. This exploratory research provides insight into key program issues in a manner designed to stimulate meaningful dialogue among aviation management faculty based on a study of 56 collegiate aviation baccalaureate programs. This investigation resulted in a taxonomy of aviation management curricula that examines: 1) breadth of curriculum; 2) science foundation; and, 3) curriculum structure. Research results show that two primary dimensions emerged. The first is an operational versus business processing oriented dimension. The second is a functional versus asset understanding oriented curricula. The findings reveal that most programs are clustered around operational process-asset understanding. The authors advocate a need for increased business management curricula focused by industry perspective and participation.

2. C. Daniel Prather, "Stakeholder Perceptions of Specialized Accreditation by the Aviation Accreditation Board International: Part Two – Aviation Students and Industry employers," Collegiate Aviation Review, vol. 26, no. 2 (2008).

In an effort to understand the current status of specialized accreditation in collegiate aviation and the reasons why so few aviation programs are accredited by the Aviation Accreditation Board International (AABI), a comprehensive study was undertaken to determine the perceptions held by the following four stakeholders of collegiate aviation regarding specialized accreditation by AABI: administrators of both AABI accredited and non-AABI accredited aviation programs, collegiate aviation program students, and aviation industry employers. This article is the second in a series of three reporting the results of this nationwide study, and presents the

perceptions of collegiate aviation students and aviation industry employers. Recommendations specific to part two of this nationwide study include: (a) Collegiate aviation students should become better informed about AABI and the current accreditation status of the program they attend; and (b) Aviation industry employers should be willing to collaborate with AABI on developing quality aviation graduates via the AABI Industry-Educator Forum and consider placing an emphasis on hiring graduates of AABI accredited programs.

3. William R. Caldwell, "Quality Improvement in Aviation Education: A Framework for Programmatic Assessment and Quality Improvement," Collegiate Aviation Review, vol. 25, no. 1 (2008).

There is a growing concern in higher education for a system of assessment and program quality improvement. This paper introduces a program evaluation system that may be used for evaluating higher education programs in a manner that provides an understandable quantitative quality metric. It provides background on the movement of higher education into the realm of quality management of educational processes, the national quality movement in public education, and efforts by the International Standards Organization and its affiliate organizations to establish international standards for education. Finally, it describes a seven-step assessment and quality improvement process. These steps reflect structure found in the Kirkpatrick Model of Program Evaluation and guidelines provided by the Central Missouri State University Quality Improvement Plan.

4. C. Daniel Prather, "The Council on Aviation Accreditation: Part One – Historical Foundation," Journal of Air Transportation, vol. 11, Issue 2 (2006).

The CAA was established in 1988 in response to the need for formal, specialized accreditation of aviation academic programs, as expressed by institutional members of the UAA. The first aviation programs were accredited by the CAA in 1992, and today, the CAA lists 60 accredited programs at 21 institutions nationwide. Although the number of accredited programs has steadily grown, there are currently only 20 percent of UAA member institutions with CAA accredited programs. In an effort to further understand this issue, a case study of the CAA was performed, which resulted in a two-part report. Part one focuses on the following questions: (a) why was the CAA established and how has it evolved; (b) what is the purpose of the CAA; (c) how does a program become accredited by the CAA; and (d) what is the current environment in which the CAA operates. In answering these questions, various sources of data (such as CAA documents, magazine and journal articles, email inquiries, and an on-line survey) were utilized. Part one of this study resulted in a better understanding of the CAA, including its history, purpose, and the entire accreditation process. Part two examines the contemporary issues being faced by the CAA and provides recommendations to enhance the future growth of the organization.

5. C. Daniel Prather, "The Council on Aviation Accreditation: Part Two – Contemporary Issues," Journal of Air Transportation, vol. 11, Issue 3 (2006).

The CAA undertook a two-part study. See above for part one's overview. This second part allows for a more thorough understanding of the contemporary issues faced by the organization, as well as alternative strategies for the CAA to consider in an effort to increase the number of CAA accredited programs and more fully fulfill the role of the CAA in the collegiate aviation community.

6. Gregory L. Schwab, "An Examination of the Indiana State University Aerospace Administration Program," Journal of Air Transportation, vol. 10, Issue 1 (2005).

Declining enrollments in the Indiana State University (ISU) aerospace administration program prompted this case study, which evaluates the program in comparison with parallel programs at other universities, industry standards, and an independent audit. Survey instruments were administered to graduates, faculty, and employers for their views on competencies of an excellent aerospace administration program. Results show the deficiency of the ISU program. Graduates, faculty, and employers rated all competencies—from moderate to considerable importance—similarly for an excellent program. Recommendations for program improvement were made, and suggestions for further research include studies to evaluate the effectiveness of a revised aerospace administration program.

7. Edwin D. Phillips and Robert W. Kaps, "Defining Aviation Management," Collegiate Aviation Review, vol. 23, no. 1 (October 2005), pp. 65-71.

The term aviation management is widely used in academia and elsewhere, yet there is no accepted definition of the term. This short article discusses separately the meaning of the constructs aviation and management and ends proposing a definition of aviation management. The intent is to initiate a dialog that results in eventual agreement on the meaning of the term among members of academia.

8. E.D. Phillips, "A Critique of Aviation Management Programs," Collegiate Aviation Review, vol. 22, no. 1 (October 2004), pp. 39-56.

Periodic critique is a characteristic of successful organizations. This article uses the concepts of critical management research to describe and critique all UAA aviation management bachelor degree programs. Narrative and tabular description is provided of the location, title, department administrative location in the university, mission and courses offered by UAA member schools. A brief history of the introduction and purpose of aviation management is offered. Critique is made regarding the lack of a clear definition of "aviation management," and that the technological attraction of aviation flight education may overshadow the role of aviation management education. Specific recommendations are made to improve the current state of aviation management programs.

9. Merrill R. Karp, "University Aviation Education: An Integrated Model," Collegiate Aviation Review, vol. 18, no. 1 (2000), pp. 1-11.

University aviation training programs, because of their comprehensive academic environments, offer excellent opportunities to develop and deliver state-of-the-art aviation curricula and become the new primary resource for commercial airline pilots (as opposed to the military). This paper draws upon research conducted in the Aeronautical Management Technology Department at Arizona State University (Karp, 1996) and addresses potential educational enhancements through the implementation of an integrated aviation learning model, AERO. The AERO model is a learning strategy that incorporates elements of the adult education paradigm, learning style theory, cooperative and collaborative learning techniques, and personal computer-based aviation training devices (PCATDs), to span the long-term retention and application gap that can occur between the classroom and the flight line. This paper suggests that the AERO model, when combined with flight training that emphasizes airline procedures from the beginning, has the potential to reduce the pilot training time required between the universities' academic classrooms and flight training environments, and the commercial airline cockpit.

10. Paul D. Lindseth, "Developing a Model of Four-Year Aviation Program Quality: A Grounded Theory Approach," Collegiate Aviation Review, (Fall Education Conference of the University Aviation Association September 1998), pp. 11-23.

There has been a rapid increase in the number of four-year aviation programs in the U.S. from 20 programs in 1968 to over 70 programs at the time of this report (UAA, 1994). The quality of these programs is difficult to determine since no research, other than accreditation standards, could be found concerning what criteria comprise a high quality four-year aviation program. Furthermore, having aviation professionals prepared through quality academic programs seems essential for the safe operation of the aviation industry. The purpose of this qualitative study was to identify criteria that support a definition or theory of quality within four-year aviation programs in the U.S. Using Glaser and Strauss' (1967) grounded theory approach, data were collected from U.S. baccalaureate aviation program administrators and directors of training from U.S. major and regional airlines. Eighty-two responses (63% response rate) were used in the analysis. Categories of criteria emerging from the study, such as curriculum, students, and faculty, were used to develop a model of four-year aviation program quality. Results of this study have implications for aviation program administrators and faculty for developing higher quality four-year aviation programs by placing more emphasis on identified criteria of program quality.

11. R.A. Martin, "The Relationship of Document and Quantitative Literacy with Learning Styles and Selected Personal Variables for Aviation University Students," Collegiate Aviation Review, vol. 18, no. 1 (October 2000), pp. 26-40.

The purpose of this study was to determine the extent to which university student scores on a researcher-constructed quantitative and document literacy tests were associated with learning style, program of study, cumulative grade point average, and year in school. Instruments used for the study were the 35 question Aviation Documents Delineator (ADD) and the Learning Type Measure (LTM). Data collected were analyzed using a step-wise multiple regression analysis technique. The ADD was designed to identify a student's ability and preference for interpreting

and using graphic or tabular data. Study results reveal that year in school and GPA were significant predictors of literacy scores on the ADD while learning style and the student's program of study were not.

12. P.D. Lindseth, "Assessing the Environment and Outcomes of Four-year Aviation Programs: Does Program Quality Make a Difference?," Collegiate Aviation Review, vol. 17, no. 1 (October 1999), pp. 40-52.

The higher education literature concerning academic program quality offers differing opinions as to which indicators should determine program quality (Cameron, 1987; Tan, 1992). Recently, greater attention has been focused upon the environment and the outcomes of higher education academic programs (Astin, 1991). The purpose of this study was to determine to what extent the highest quality U.S. four-year aviation programs follow current literature trends and emphasize environment and outcome indicators of quality. Students (N=447), faculty (N=167), and alumni (N=577) from high, medium, and low quality four-year aviation programs as determined in Lindseth's (1996) study, were surveyed using the Educational Testing Service's Program Self Assessment tool. The instrument measures perceptions of students, faculty, and alumni toward 16 composite characteristics or indicators of academic program quality. Results showed that except for the indicator internship experiences, the emphasis placed on environment and outcome indicators of academic program quality was not significantly different at the highest quality U.S. four-year aviation programs as compared to intermediate and low quality four-year aviation programs.

13. J.A. Johnson, and M.D. Ferguson, "Setting the Foundation for Effective Learning: Utilizing the Cognitive, Affective, and Psychomotor Domains to Establish Rigorous Performance Learning Objectives in Postsecondary Aviation Programs," Collegiate Aviation Review, vol. 16, no. 1, (1998).

American institutions of higher education have become increasingly scrutinized by governmental agencies, organizations, and the public (Wingspread Group on Higher Education, 1993). Accountability to these constituents has presented itself as a unique challenge to higher education. Greater accountability has also manifested an increased demand for effective assessment programs (Banta, Lund, Black, & Oblander, 1996). Accountability and assessment have undoubtedly emerged into postsecondary aviation as well. Consequently, aviation programs must continually justify their existence in providing a highly needed and important resource to society by preparing well-educated and skilled graduates for the workplace. If credible assessment programs reveal problems in educational outcomes, then likely candidates for review are the performance learning objectives in the classroom. The authors present the argument that rigorous, well-developed performance learning objectives provide the underlying foundation for effective learning. The importance of establishing clearly stated, specific performance learning objectives and its relationship to the learning environment are also discussed. Effective performance learning objectives will not only enhance student learning experiences in the aviation classroom, but will favorably affect program strength and ultimately, institutional effectiveness.

14. P.D. Lindseth, "Developing a Model of Four-year Aviation Program Quality: a Grounded Theory Approach," Collegiate Aviation Review, vol. 16, no. 1 (1998).

There has been a rapid increase in the number of four-year aviation programs in the U.S., from 20 programs in 1968 to over 70 programs today (UAA, 1994). The quality of these programs is difficult to determine since no research, other than accreditation standards, could be found concerning what criteria comprise a high quality four-year aviation program. Furthermore, having aviation professionals prepared through quality academic programs seems essential for the safe operation of the U.S. air transportation industry. The purpose of this qualitative study was to identify criteria that support a definition or theory of quality within four-year aviation programs in the U.S. Using Glaser and Strauss' (1967) grounded theory approach, data were collected from U.S. baccalaureate aviation program administrators and directors of training from U.S. major, national, and regional airlines. Eighty-two responses (63% response rate) were used in the analysis. Categories of criteria emerging from the study, such as curriculum, students, and faculty, were used to develop a model for four-year aviation program quality. Results of this study have implications for aviation program administrators and faculty for developing higher quality four-year aviation programs by placing more emphasis on identified criteria of program quality.

15. M.A. Sherman, (2006), "A qualitative study of collegiate aviation institutions and the collegiate aviation accreditation process," UMI No. AAT 3245753.

A qualitative study to understand the decision factors involved as institutions of higher education in aviation consider undertaking CAA accreditation and to gather data related to organizational structure and resource allocation while completing the accreditation process. An online questionnaire was utilized to obtain institutional factual data, perceptions, and opinions regarding the accreditation process, and to collect demographic, self-study organization, and financial data regarding aviation program accreditation as well as to assess perceptions of the participants.

Accredited respondents or institutions seeking program-specific accreditation indicated the accreditation process provides validation of academic programs by an external agency. Data analysis indicates sentiment towards CAA accreditation resides in one of two distinct categories with no middle ground. Institutional administration and higher education culture consider external program specific-accreditation important because it validates what the department is teaching to students. Accredited institutions do not automatically accredit their entire program. Initially, capital expenditure is one reason, and reorganization of additional programs until they can meet current standards is another. Institutions which are not interested in seeking accreditation question the value and price of seeking accreditation. Smaller aviation programs are not aware that aviation-program-specific accreditation exists, considering their accreditation status is derived from the Federal Aviation Administration through Parts 61, 141, or 147 certification and question what benefit is derived for students from CAA accreditation. Several comments were received to indicate the majority of smaller aviation institutions or community colleges either have not heard about CAA or do not accept program-specific accreditation.

16. R.O. Fanjoy, (2004), "Prediction of collegiate aviation student competency levels," UMI No. AAT 3154624.

The purpose of the present study was to identify predictor variables for use in the selection, retention, and academic remediation of collegiate aviation students. This work builds on student retention and achievement theory developed by Tinto (1982) as well as research into non-cognitive predictors of college student success conducted by Sedlacek and associates (Ancis & Sedlacek, 1997; Getzlaff, Sedlecek, Kearney, & Blackwell, 1984; Sedlacek & Adams-Gaston, 1992; Tracey & Sedlacek, 1986). Both bodies of research suggest social and academic integration are important aspects of student achievement. In addition, large sample studies of military training pilots offer insight to flight training achievement and retention for potential application to a college cohort.

Findings from the studies identified above were used to identify measures with potential for predicting the achievement and academic success of college students participating in an aviation training baccalaureate degree program. Students enrolled in aviation programs at six universities completed a short biographical survey designed to measure flight experience levels as well as aspects of social and academic integration. Predictive measures were examined for relationships with freshman and current grade point averages. Participants at one site also were evaluated with a written examination of advanced aviation competency and a flight simulation profile. Results of the data analysis support earlier studies that identified a significant relationship between high school grade point average and college academic achievement. In addition, findings from the present research suggest strong and weak areas of performance as well as levels of preference for a lecture format are significantly related to academic achievement of aviation students. Data analysis also suggests positive relationships exist between academic achievement and both faculty and peer interaction. Finally, a positive relationship was found between total flight time experience and cumulative grade point average. Little support was found for relationships between predictive factors examined during this study and measurements of written or practical aviation competency. Analysis of some variables considered during this research suggests their utility during admissions screening of aviation students. The results of this study are discussed in terms of overall collegiate aviation training program application and potential avenues for future aviation competency research.

17. M.L. Kole, (2006), "Predictors of flight performance in novice student pilots," UMI No. AAT 3247234.

Interest in pilot performance prediction began in World War I and has continued to present day. Most research regarding pilot performance prediction has been conducted through the military and may not generalize to other groups of aviators. The present study determined specific cognitive factors which are predictive of flight performance in novice student pilots with zero hours of flight experience. Sixty-nine novice student pilots enrolled in the Aeronautical Science program at Embry Riddle Aeronautical University (ERAU) participated in the present study. Participants were administered the CogScreen-Aeromedical Edition (CogScreen-AE) and the Connors CPT-II (CPT-II) before the commencement of flight school. The CogScreen-AE assesses cognitive abilities specific to piloting an aircraft, and the CPT-II is used in the assessment of attentional problems.

Forty-four participants completed the flight program and went on to obtain their Private Pilot's License. These participants who completed flight school were evaluated by their instructors during actual flight using a Flight Data Sheet developed from the FAA's Practical Test Standards. Participants were evaluated as they were preparing for their Private Pilot License Examination or "checkride". Significant predictors of Completion/Not Completion from flight school were a combined score on the CogScreen Process Measures, the CogScreen-AE Tracking factor, and the Conners Confidence Index. Flight Performance was significantly predicted by the CogScreen-AE Speed/Working Memory factor.

18. A.S. Hankins, (2007), "Quality characteristics in aviation baccalaureate programs: A content analysis of collegiate publications," UMI No. AAT 3284242.

Prospective students in the aviation career field are faced with a wide array of choices in baccalaureate programs. Accordingly, it is important for postsecondary institutions to ensure that their promotional materials showcase the attributes that influence student choice. Purposeful monitoring of the content and language contained in collegiate promotional materials takes on critical significance in maintaining a competitive edge in recruitment. Quality has been identified as a major factor in aviation baccalaureate student choice. Recognizing that quality is an important factor to prospective students, the question of what elements define quality in aviation baccalaureate programs arises. Previous research resulted in the development of a model for quality in aviation programs that enumerates ten quality characteristics as determined by aviation industry experts and educators. The purpose of this study was four-fold: 1) to identify and establish the quality indicators of aviation academic programs; 2) to apply these quality indicators to 72 aviation programs and rank order these programs; 3) to examine the publications and marketing materials disseminated by these programs; and, 4) to compare and contrast the nature of these materials in top-ranked and lower-ranked aviation programs. A software program that performs a controlled content analysis on text, DICTION, was used for analysis.

The findings of the study are as follows: (a) it is feasible to apply a set of uniform quality indicators to aviation academic programs; (b) a significant variety exists across programs in terms of these indicators; (c) the content analysis demonstrated a significant difference in the verbal tone found in promotional materials for two of the DICTION master variables. Future research is needed that includes additional stakeholders (such as prospective students and their parents) in order to develop other notions of aviation program quality, such as flight safety records or other measurable program outcomes. In addition, the development of custom aviation-specific dictionaries for the DICTION software may improve the usefulness of the program in evaluating promotional materials.

19. D.M. Brown, (2007), "Quality indicators for collegiate professional pilot training programs: A Delphi study," UMI No. AAT 3259590.

The purpose of this study was to identify the quality indicators that comprise an exceptional collegiate professional pilot program as identified by a national panel of experts in aviation higher education. A Delphi panel of 13 experts participated in a 3-round Delphi to identify quality indicators in nine categories. This was accomplished through generation of qualitative comments in the first Delphi round, following by rating and ranking of categories and items within categories in two subsequent rounds. In the findings and conclusions, the Delphi panel of

experts provided their perceptions of quality indicators within nine categories and were in clear agreement concerning the relative importance of categories and items within categories. The categories in descending order of importance were: Faculty; Equipment and Technology; Curriculum and Instructional Delivery; Government (FAA) Compliance; Facilities; Assessment/Evaluation; Flight/Administrative/Staff Support Services; Completion Rates; and Student Organizations. Analyses of panelists' overall comments were based on E Rank scores, mean ratings for importance, and tier analysis.

In the top-rated category, the issue of faculty pay was identified as the most important quality indicator for collegiate flight training programs. Other important issues included the need for programs to utilize technologically advanced aircraft (TAA) and/or flight simulators for flight training; use of real-world scenarios or activity-based learning; fully comply with FAA regulations; provide adequate space for all types of training and maintenance; formally assess higher order thinking and learning skills; provide administrative support staff; monitor completion rates; and involve faculty and students in various collegiate aviation organizations. Overall, panelists identified quality indicators that represented best practices but did not provide benchmarks for measuring program quality. The findings of this study could be used as a starting point from which to further identify benchmarks for determining flight training program quality.

### **Career/Employment Pathway Development**

1. Jose R. Ruiz, "Airline Flight Operations Internships: Perspectives," Journal of Air Transportation, vol. 9, Issue 1 (2004).

The purpose of this study was to identify the manner in which former interns from multiple airlines perceived their airline flight operations experience and its value in the pursuit of career goals. The population was composed of former interns from the Southern Illinois University Carbondale (SIUC) Aviation Management and Flight (AVMAF) program. A Likert scale questionnaire was used in the study. Descriptive statistical methods and Kruskal-Wallis tests were used to analyze the data. Results of the study indicate that respondents perceived their internship to be a positive experience with significant value in the pursuit of career goals. There were no statistically significant differences in the manner in which respondents from different airlines perceived their airline flight operations internship experience.

2. Edwin D. Phillips, "Aviation Management Role Models in the Deregulated Era," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 101-119

Aviation management students in college and industry benefit by being provided credible role models. This research provides a methodical and valid approach to identify aviation industry leaders in the deregulated era. The research uses literature review of highly credible national awards and a unique survey of senior industry managers.

3. Edwin D Phillips, Jose Ruiz, and Hitesh Mehta, "Industry Members Evaluate the Strengths and Weaknesses of Aviation Management Graduates," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 120-131

This study sought to identify the strengths and weaknesses that members of the aviation industry have observed in recent aviation management graduates. A review of aviation education and business literature indicated that prior research in this area has been limited to asking members of the industry to identify: 1) skills and knowledge desired; and, 2) what types of courses would be most beneficial. No known previous research has asked industry members how aviation management graduates are actually performing. The UAA organized the first meeting of an Aviation Management Committee during the UAA Fall Education Conference in Toronto, Canada on October 7, 2004. The committee suggested conducting a study that identified what individuals in the aviation industry thought were the strengths and weaknesses of aviation management graduates. That suggestion served as the impetus for this study. One hundred seventy-one respondents provided usable comments representing 33 UAA member institutions. Comments were categorized according to four prevailing themes: 1) business knowledge and experience; 2) personal behavior; 3) computer and technical skills; and, 4) communication and interpersonal skills. Survey findings are examined, interpreted and discussed. Suggestions are provided that could improve a graduate's ability to meet the expectations of industry. Recommendations for additional research are also provided.

4. Stephen M. Quilty, "Perceived Educational Knowledge Differences Among Airport Managers and Entry-level Airport Operations Employees," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 148-158.

Airport managers, supervisors, and operations personnel at various airports throughout the United States were surveyed to assess the knowledge and skill requirements necessary for airfield operations personnel. They were then asked to assess the degree to which recent college graduates of aviation programs or new hires met the desired requirements. This paper presents findings comparing the two assessments and discusses the differences between desired knowledge and actual knowledge of new hires. Results of the study have implications for university and college aviation programs that offer aviation or airport management curricula as well as for airport organizations.

5. D.A. NewMyer, and RTC Owen, "Aviation Employment in the U.S.: A Review of Data Sources," Collegiate Aviation Review, vol. 21, no. 1 (October 2003), pp. 46-59.

The aviation industry—particularly the airline and aviation/aerospace manufacturing segments—has received significant negative attention due to financial and employment losses that it has suffered since the terrorist attacks of September 11, 2001. For example, nearly 150,000 jobs have been reported cut at the airlines and aviation/aerospace manufacturers combined. However, there is little said about the overall aviation industry backdrop for these cuts: How large is U.S. aviation industry employment after these publicly announced cuts? The problem addressed by this research was one of finding sources to determine the overall size and scope of employment. A literature review was used that examined government documents, scholarly journals, aviation industry journals and information provided by aviation industry associations. In addition, the results of a telephone survey of the top 100 airline-served airports in the U.S. were utilized. The literature review found that U.S. aviation industry employment as of 2002 ranged from 1,870,400 to 2,169,845 depending on the data sources used to arrive at the total. It was also concluded that there are data details not available from the U.S. Department of Labor statistics on the aviation industry that are important to determining a conclusive employment estimate.

6. C. Daniel Prather, "Airport Internships: Effectively Structuring a Departmental Rotation Internship," Collegiate Aviation Review, vol. 17, no. 1 (October 1999), pp. 53-73.

This study on the perceptions of airport managers regarding airport internships is one aspect of a paper entitled "Airport internships: Combining formal education and practical experience for a successful airport management career", which was prepared as a requirement for the AAAE accreditation program. The remaining aspect of the AAAE paper, which was published in the 1998 Collegiate Aviation Review, is a study on the views of airport managers regarding post-secondary aviation education. Findings presented do not necessarily reflect the views of Prather's employer, the Hillsborough County Aviation Authority.

7. James L. Thiesse, David A. NewMyer, and Leland L. Widick, "FBO and Airport Internships for University Aviation Students: Benefits for Students, Universities, and the Aviation Industry," Journal of Studies in Technical Careers, vol. 15, no. 4 (1992), pp. 253-264.

In this article, the authors note that internships provide important professional development opportunities and experiences for students. The various tasks that may be assigned to interns are discussed within the framework of four orientations: job shadowing; departmentally-based activities; academically-based activities; and specific tasks. The authors also identify a list of organizations that can provide information on starting internship programs and provide a framework for considering the general structure and the value of aviation internships. Specifically, this is for airport internships including those at fixed-base operators (FBOs).

The authors define aviation internships and note the employer's obligations. They also detail the structure and format of internships as well as their benefits and problems. The student, the airport, the university, and the industry benefit from such a program in a variety of ways that the authors discuss more fully in the article.

8. David A. NewMyer, Karen Korir, and Hitesh Mehta, "Employment at Commercial Service Airports in the USA: Survey Results," Collegiate Aviation Review, vol. 23, no. 1 (October 2005), pp. 45-64.

The purpose of this research was to ascertain the size and scope of employment at U.S. commercial service airports (CSAs) by: 1) determining the number of full-time and part-time employees employed directly by the operating entities of CSAs; 2) determining the total number of employees employed at these CSAs, including those working not only for airport operators, but also for airport tenants; and, 3) comparing the findings to figures found in literature. A literature review was conducted, and all 510 U.S. CSAs were contacted by phone and/or mail and asked to complete a five-question survey. A response rate of 95.1% (n=485) was obtained. Survey results indicate there are 45,067 full-time and 2,558 part-time employees directly employed by CSA operators. Additionally, when airport tenants are taken into account, survey results indicate 1,154,660 people are employed at CSAs. This study provides more detailed airport employment data than that which is available in current sources, such as the U.S. Department of Labor. It also provides a larger sample size and more comprehensive analysis than previous recent studies, such as the one reported in the November/December issue of *Airport Magazine*.

9. David A. NewMyer, Jose R. Ruiz, and Ryan E. Rogers, "University Flight Operations Internships With Major Airlines: Airline Perspectives," Journal of Air Transportation Worldwide, vol. 5, no. 2 (2000), pp. 111-129.

In this study, the authors examine the partnerships between U.S. airlines and aviation-oriented universities that have flight internship programs. Using a literature review and phone surveys, the authors investigated the similarities and differences between the top 12 airlines' internship programs. The authors made the following conclusions. First, these internship programs serve two to 40 interns per semester per airline (roughly 135 to 181 students per semester). Secondly, the 12 airlines work with a total of 103 colleges and universities with some partnerships ranging from one university per airline to 22 universities per airline. Third, two of the 12 airlines pay their flight operations interns. Fourth, a majority of airlines reported offering the benefits other than pay including tours, jump-seat privileges, simulator training, and travel passes. Fifth, 29 locations for flight operations internships were reported by the 12 airlines with six of the airlines offering more than one location. Sixth, six of the 12 airlines offered post-internship travel pass privileges. Finally, five of the 12 airlines offered guaranteed pilot employment interviews to those students that successfully completed the internships. The authors also dispel some of the myths that have surrounded flight internship programs.

10. Jose R. Ruiz, David A. NewMyer, and D. Scott Worrells, "An Evaluation of a Major Airline Flight Internship Program: Participant's Perceptions of Curricular Preparation for, and Components of, the Internship," Collegiate Aviation Review, vol. 17, no. 1 (October 1999), pp. 74-94.

The authors surveyed 110 former university interns who served in semester-long flight internships at United Airlines. The purpose was to ascertain how well their university coursework prepared them for the internship programs. Seventy-eight of the respondents indicated that their university curriculum prepared them either well or very well for their internships. Nearly 81 percent of the respondents indicated that the internships had a great or significant impact on them achieving their career goals. Ninety-six percent said they would recommend an internship with United Airlines.

Two types of internships were included in the analysis. The short internship was a two-week program, and the long internship was a semester-long program. The value of both programs and the level of academic preparation for these programs were assessed. The evaluation of the coursework was specific to Southern Illinois University, Carbondale. The courses that rated "most helpful" or "very helpful" in preparing students for internships were airline management, cabin environment and jet transport systems, flight systems management, air transport labor relations, and aviation industry career development.

11. David A. NewMyer, Jose R. Ruiz, and Scott Worrells, "A Pioneering University-Airline Flight Internship Program: A Follow-Up Study of Intern Participants," The Journal of Aviation/Aerospace Education and Research, vol. 8, Winter (1998), pp. 23-33.

This study uses data collected from the same survey mentioned in the article above. While that study focused on academic preparation for internships, this analysis sought to discover if the purposes of the internships had been fulfilled. The survey also gathered information on the characteristics of the internship participants such as their current employment with the goal of discovering how many of them were hired by United Airlines. The authors describe the United Airlines – Southern Illinois University, Carbondale internship program and discuss the

characteristics of its participants. A qualification profile of the average respondent hired by United Airlines is described.

12. Bruce J. Hulley, "General Aviation: A Stepping Stone To a World Career in Aviation," Journal of Air Transportation Worldwide, vol. 4, no. 1 (1999), pp. 36-47.

The future of the world's air transportation system is based on the available work force to safely operate this complex mode of transportation. Most airline pilots started their aviation careers in a general aviation aircraft. General aviation includes all aviation except military and commercial aviation and has the most pilots and aircraft. Not all people are suited to be airline pilots. Those who do not pilot commercial aircraft can find related employment in the aviation industry. According to the authors, youth should be exposed to the industry in order to guarantee the availability of an aviation work force of the future. They should be offered the chance to enter an aviation career through a well planned aviation/aerospace, activity related youth program. The purpose of this paper is to suggest and identify resources of cooperation that can motivate young people to enter future aviation careers through general aviation and organized aviation.

13. T.G. Flouris, and B. Gibson, "Aviation Management Job Placement: The 2002 Perspective," Collegiate Aviation Review, vol. 20, no. 1 (September 2002), pp. 29-48.

Successful job placement of aviation management graduates is highly beneficial to university aviation management programs as well as organizations that offer positions to aviation management graduates. A critical aspect of job placement involves understanding the preferences and perceptions of students and employers regarding jobs. This paper reports the results of a survey of undergraduate aviation management students from four universities regarding their preferences and perceptions vis-à-vis employment. Results include a demographic profile of the respondents, their organization/functional area preferences and their perspectives on selected job selection factors and issues.

14. C.D. Prather, "Post-secondary Aviation Education: Preparing Students to Manage Airports of the 21st Century," Collegiate Aviation Review, vol. 16, no. 1 (1998).

This study on the perceptions of airport managers regarding aviation education is one aspect of a paper entitled "Airport internships: Combining formal education and practical experience for a successful airport management career", which was prepared as a requirement for the AAAE accreditation program.

15. P. Bos,(2006), "A job task analysis of the small-airport manager in the Midwest region," UMI No. AAT 3213454.

A job task analysis provides a basis for establishing the knowledge, skills, and abilities (KSA) of the small non-hub general aviation airport manager. Ten airports in the Midwest were studied to determine what job tasks small-airport managers perform on a daily, monthly, and yearly basis. These job tasks are separated into seven categories providing a basis for the inventory of knowledge, skills, and abilities. The current paradigm among airport professionals is that small airport managers, as a group, need more training to provide the National Airspace System with a greater level of support.

This research has determined that small-airport managers lack basic training in airport administration, public administration, and business; however, they overcome disadvantages with a vigorous can-do attitude. Small-airport managers surmount obstacles and produce a

satisfactory result in a role for which they were not originally trained. The small airport manager relies on many sources for information and uses those sources to perform the day-to-day tasks. Some managers are classified as caretakers only, while other managers are deeply involved in all aspects of the airport operations. Ultimately, an inventory of knowledge, skills, and abilities, is listed for the small general aviation airport owner to use as a model when hiring an airport manager.

16. C.J.K. Walker, (2008), "A qualitative inquiry of educational requirements of selected professions in the Oklahoma aerospace industry," UMI No. AAT 3307162.

This report is based on interviews of holders intellectual capital positions at Boeing Company in Oklahoma. The aerospace industry is a dynamic industry that requires continual skill updates to keep up with advancements in technology and operational trends within the industry. The purpose of this study was to examine intellectual capital requirements of selected professional positions within the company. Data obtained through interviews was used to determine if educational skills gaps existed. The findings of the study can be used to develop an aerospace educational pipeline based on collaborative relationships between industry and higher education to facilitate educational and training programs. Three broad research questions centered on educational background, career progression, and gaps. A purposive sample of 10 professional positions was selected for interviews using an interview guide containing 18 questions. Data was analyzed using manual coding techniques.

The study found that minimum education requirements for selected professional positions consist of a bachelor's degree. Although the majority of participants identified a business degree as optimal, several participants indicated that an education background from multiple disciplines would provide the greatest benefit. Data from interviews showed educational degrees were not specialized enough and skills required to perform job functions were obtained through direct on the job experience or through corporate training. Indications from participant responses showed employees with a thorough knowledge of government acronyms had a decided advantage over those who did not. Recommendations included: expanding the study to multiple organizations by conducting a survey; expanding industry and academic partnerships; establishing a structured educational pipeline to fill critical positions; creating broad aerospace curricula degree programs tailored to industry needs; incorporate additional capstone and internship opportunities to bridge classroom learning and experience; and establish an industry/academic liaison to develop internship opportunities.

17. J.F. Pendergrass, (2008), "A study of career choice factors and students' academic success at an aviation school," UMI No. AAT 3307151.

The purpose of this study was to describe the reasons why students choose careers in aviation, and to determine if there is a relationship between the reasons for career choice and student academic success in aviation training. This study used a mixed-method empirical design that incorporated both quantitative and qualitative data gathering and analysis techniques, using a survey and telephone interviews. The participants in this study ranked "aviation is exciting" as the factor that most influenced their decisions to pursue a career in aviation, and two-thirds listed pilot as the aviation job that was most attractive to them. Even though the completion rate for the population in the study was only 25%, 67% of the students who responded stated they had completed an associate's degree. Program completers were more likely to have learned about aviation careers earlier than non-completers, and both completers and non-completers indicated that family, friends, and media sources were the strongest influence in their career choices.

18. J.B. Bridewell, (2007), "Aviation graduates' competencies, 2000--2007: Perceptions of aviation educators and industry representatives in the United States," UMI No. AAT 3282911.

This study surveyed the perceptions of collegiate aviation educators, collegiate aviation institution representatives, and aviation industry stakeholders who were members of the UAA as of February 5, 2007. Survey forms were sent to 353 prospective participants and there was an overall response rate of 47.6%. The survey consisted of a list of 16 knowledge and skill competencies with Likert-type responses for each participant to indicate the level of importance each placed upon those competencies for collegiate aviation graduates and the level of satisfaction each had that collegiate aviation graduates actually possess those competencies upon graduation. Two open-ended questions pertained to the strengths and weaknesses of collegiate aviation programs or their graduates. Another allowed for general comments.

The statistical analyses indicated that all three groups were most satisfied with graduates' technical skills and least satisfied with communications skills. Analyses indicated that a balance of technical skills and a liberal education was essential for program success. All knowledge and skill competencies were shown to have high to very high importance levels, but only medium to high satisfaction levels. Results indicated that graduates were perceived to possess all stated competencies, but to a lesser degree than desired. Successful collegiate aviation programs existed, but there was room for improvement. Aviation industry needs must be addressed by academia for any collegiate aviation program to be successful, but results indicated that the aviation industry needs to take a larger role in the development and refinement of collegiate aviation programs. Finances for institutions, programs, and students were a major concern for the foreseeable future. Administrators should consider how their actions affect the overall success of their programs.

19. J.L. Menees, (2007), "New graduate joins passenger airline: A study of aircraft mechanic certification," UMI No. AAT 3258364.

This research explores the training of airframe and powerplant (A&P) mechanics at FAA approved schools in the United States. The curriculum that is used in the schools was last updated by the FAA in 1972. This mixed-methodology study was conducted in two phases. First, the FAA approved schools were surveyed to explore faculty members' satisfaction with the curriculum and the quality of the graduates. Following the survey, members of the aviation maintenance employment field were interviewed regarding their satisfaction with the new A&Ps that are hired after completion of the program at FAA approved schools. Findings related to the research may lead to an update of the FAA curriculum that could improve the initial training of aviation maintenance workers.

20. D.C. Ison, (2009), "Pathways to the aviation professoriate: An investigation into the attributes and backgrounds of professional pilot education faculty," UMI No. AAT 3350009.

The purpose of this study was to identify the pathways professional pilot program faculty take to reach their positions as faculty in aviation programs. Data were collected through a survey that was distributed via the internet using Survey Monkey. Pathways were defined by investigations into the occupational and educational histories of the faculty. Also, demographic attributes of the faculty were collected to create a comprehensive picture of the faculty. Statistical analysis of the survey data was conducted using SPSS Graduate Pack software. The researcher also sought to establish the motivations and influences that guided professional pilot program faculty along their pathways to the professoriate. Data about these internal and external stimuli were collected through semi-structured interviews. Interview transcripts were coded and analyzed through the use of Nvivo qualitative research software to identify these themes.

Findings indicate that professional pilot faculty take a range of occupational and educational pathways to reach their positions in aviation higher education. Two primary pathways were identified: the military and the non-military (civilian). Each of these subgroups had unique attributes and distinctive career paths. All faculty reach their current position with similar levels of academic and flight credentials as well as length of industry experience. Aviation faculty of all types were found to be highly qualified and had extensive aviation experience.

21. J.F. Fullingim, (2007), "Regional airline qualifications: A study in the marketability of higher education graduates," UMI No. AAT 3300942.

The recent emergence and growth of regional airlines in the United States has placed a strain on the supply of pilots who are needed for staffing scheduled flights. This present pilot shortage is presenting challenges for two-year colleges and four-year universities with aviation programs to produce more pilot graduates in less time to meet the staffing demands made by the regional airlines. With this shortage, the pressing issues of how to train and hire qualified pilots to fly technologically advanced regional airline jet aircraft have forced the industry to demand more aviation skills from a shrinking market of aviation pilot candidates. Colleges and universities with aviation programs have been forced to compete with outside private aviation schools on a larger scale in the training of collegiate students for airline employment opportunities.

The primary purpose of this study was to identify any inadequacies in the higher-education aviation curricula and to propose changes needed to better qualify aviation students in the hiring process at regional air carriers. This study concentrates on the principle that higher education is necessary for advancing a pilot's aptitudes and abilities to perform the highly technical tasks of a professional pilot in a regional airline environment. The avenues of obtaining aviation experience along with flight certificates and ratings in an academic environment from two-year colleges and four-year universities with aviation programs is examined, along with qualifying these schools with the criteria regional airlines expect from new pilots hired. A survey was used to poll the pilots from two regional airlines that were based in Texas. By analyzing the responses from the returned surveys, the quality of training that exists in higher education aviation programs is revealed. The study confirms the value of advising a path of higher education for students embarking on an aviation career as a pilot for a regional airline. The study concluded that two-year colleges and four-year universities with aviation programs are meeting the present demands made by the regional airlines.

22. D.A. Byers, (2004), "The making of the modern airport executive: Causal connections among key attributes in career development," UMI No. AAT 3127101.

The purpose of this study was to identify specific career development attributes of contemporary senior-level airport executives and to evaluate the relationship of these attributes to the level of satisfaction airport executives have in their career choice. Attribute sets that were examined include early aviation interests, health factors, psychological factors, demographic factors, formal education, and other aviation-related experiences. A hypothesized causal model that expressed direct and indirect effects among these attributes relative to airport executives' career satisfaction was tested using sample data collected from 708 airport executives from general aviation and commercial service airports throughout the United States. Applying a multiple regression analysis strategy to the model, the overall results revealed that 16% of the variability in airport executives' career satisfaction scores was due to the collective influence of the six research attribute sets; this is significant. The results of the path analysis also indicates that four attribute sets (early aviation interests, health factors, formal education, and other aviation-related experiences) have respective direct significant effects on participants' career satisfaction. Early aviation interests, health factors, and demographic factors have additional indirect effects on career satisfaction; all are mediated by formal education attitude. These results are inconsistent with the hypothesized path model and a revised model was developed to reflect the sample data. The findings suggest that airport executives, as a group, are satisfied with their career choice. Early aviation interests appear to play an important role for influencing the career field selection phase of career development. The study also suggests health factors, formal education, and other aviation-related experiences such as flight training or military experience influence the compromise phase of career development. Each of these four factors have significant effects on career satisfaction. In addition to its applicability to airport executives, the study provides a generalized path model for investigating factors influencing the career development, compromise, and satisfaction process in other vocations.

### **Aviation Program Recruitment/Retention**

1. Mary Ann Turney, James C. Bishop, Merrill R. Karp, Mary Niemczyk, Ruth L. Stitler, and Mavis F. Green, "National Survey Results: Retention of Women in Collegiate Aviation," Journal of Air Transportation, vol. 7, no. 1 (2002), pp. 69-92.

The authors present preliminary findings of data collected from 390 college students (195 men/195 women) majoring in aviation programs at nine colleges and universities. The study was initiated to discover the factors that influence women once they have already selected an aviation career and to better understand what could be done to support them in their endeavors. This was done because the number of women pursuing technical careers and especially careers in aviation remain low. The results show significant areas of concern among women in flight training. Differences between males and females were found in the responses.

A surprising finding was that women in the early stages of flight training responded differently from women in more experienced stages. This did not occur with men. The results suggest that women in the more experienced stages may have gone through an adaptation process and that they may reflect more male-like attitudes about a wide array of issues including social, confidence, family and career issues.

2. Brent Bowen, Larry Carstenson, and Frederick Hansen, "Recruiting From Within: Action-Oriented Research Solutions to Internal Student Recruitment in Collegiate Aviation Education," Journal of Air Transportation Worldwide, vol. 4, no. 1 (1999), pp. 15-25.

The authors present a case of good practice in student recruitment that can be applied for the overall benefit of collegiate aviation education. The authors establish that student recruitment must be an active and ongoing commitment of the academic unit. The single case scenario presented by the authors provides examples of internal student recruitment strategies that can be applied to any academic program. Related literature is examined and reported to theoretical and applied frameworks. The results convey a system that maximizes student recruitment and concludes with a plan that can be generalized to most collegiate aviation programs.

3. Julie Massie Clark, "The Face of Collegiate Aviation: Factors Impacting Self-Selection of Collegiate Aviation Programs," Collegiate Aviation Review, vol. 24, no. 1. (September 2006), pp. 42-57.

The purpose of this study was to determine the factors that influence student selection of a four-year post-secondary commercial aviation program. Additionally, this study attempts to determine if there is a difference in factors based upon gender and race that influences choice of a four-year post-secondary commercial aviation program. Specifically, the primary focus was to collect data from aviation students regarding choice factors in enrolling in four-year post-secondary institutions. The survey method allowed the researcher to collect data from students enrolled in four-post secondary aviation programs to determine the current factors influencing student choices. In addition, the study examined enrollment data by gender and race of students in 23 four-year post-secondary aviation programs. Findings suggest the factors that influence selection of a four-year post-secondary aviation program are similar for all aviation students. The students that are drawn to four-year post-secondary aviation programs are there simply for aviation. Specifically, study results suggest that students enroll in four-year post-secondary aviation programs because they want to fly (62%). Additionally, the 10 most influential program and institutional characteristics that attract students to collegiate aviation are program educational quality, university reputation, condition of equipment, institutional educational quality, location of institution, small class size, safety concerns, program characteristics, student to faculty ratio, and distance from home. These findings are especially helpful to collegiate aviation programs that actively recruit students to their institution.

4. Jacqueline R. Luedtke and Ioannis Papazafiroopoulos, "Retention in Collegiate Aviation," Journal of Air Transportation Worldwide, vol. 1, no. 1 (1996), pp. 39-50.

The Aviation Institute at the University of Nebraska at Omaha undertook a research project to study retention issues as they relate to the institute's academic programs and the field of aviation in general. The author's note that aviation, partially due to the cost associated with training, has unique retention problems. The survey results should prove useful for other aviation programs in the United States as well as for international aviation programs. The authors mention key components of retention programs from other departments and universities, and they note that every faculty and staff member needs to be involved in retention efforts for the retention program to be successful.

5. C.A. Kanske and L.T. Brewster, "The Learning Styles of College Aviation Students," Collegiate Aviation Review, vol. 19, no. 1 (October 2001), pp. 62-70.

This study investigates the learning styles of collegiate aviation students. The results of this investigation were compared to the learning styles of qualified pilots in the U.S. Air Force, as identified in a previous study. Using the Kolb Learning Style Inventory, the objectives were to identify the learning styles of collegiate aviation students, determine if there was a difference in learning style among the grade levels of the college students, and to note the similarities and/or differences in learning styles between the collegiate aviation students and the United States Air Force pilots. The demographic survey used in the previous study was tailored to reflect the disparity of experiences between college students and active pilots in the United States Air Force. The population for this study consisted of students enrolled in the aviation programs at Oklahoma State University-Stillwater campus, Oklahoma State University-Tulsa campus, and Southeastern Oklahoma State University on the Durant campus and at Tinker Air Force Base.

6. M.R. Karp, M.A. Turney, M. Niemczyk, M.F. Green, R.L. Sitler, and J. Bishop, "Retaining Women in Collegiate Aviation by Implementing Learning Style Considerations," Collegiate Aviation Review, vol. 19, no. 1 (October 2001), pp. 92-101.

Women are clearly underrepresented in aviation. Research must be accomplished to determine which factors influence women, once they have indicated a serious interest in an aviation career, to stay in collegiate aviation programs or to leave. Addressing the issue of women's retention in aviation is one way to help address the growing commercial pilot shortage, while moving toward gender equity in this critical, national industry. Projected shortages in the commercial pilot population, coupled with the low representation of women in career pilot positions, suggest that aviation education and training institutions should re-examine the structure and organization of the aviation knowledge transfer process. Classroom enhancements could improve education methods to make them more efficient from the perspectives of increased knowledge retention, improved application to broader subjects, and reduced loss to attrition of viable pilot candidates to enter the commercial pilot workforce. This study examines how aviation education can best serve the aviation student's learning style needs. The study looks at learning style theory, from the viewpoint of the wide diversity of aviation learners who are dominantly visual, auditory, or hands-on, tactile, or kinesthetic learners, and how women's learning styles are pivotal to their success and retention in collegiate aviation. By exploring how people learn best, and then providing learners with the tools to maximize their dominant learning styles, the next generation of pilots, both women and men, should be better prepared to enter the aviation industry and help reduce the projected commercial pilot shortages.

7. M.A. Turney, "Attracting Women to Aviation Careers: What Recent Studies Reveal," Collegiate Aviation Review, vol. 18, no. 1 (October 2000), pp. 92-98.

The percentage of women attracted to careers in aviation remains surprisingly low despite efforts by the industry to increase its talent pool by encouraging women to participate. This paper presents a review of literature relevant to the question of why the numbers of women choosing careers in aviation have not increased in the past two decades, and why even those who demonstrate an initial interest in the field eventually look for career satisfaction in other fields.

8. J.A. Johnson, "An Examination of the U.S. Collegiate Aviation Workforce in Preparing the next Generation of Aviation Faculty Members Beyond 2000," Collegiate Aviation Review, vol. 17, no. 1 (October 1999), pp. 31-39.

Aviation as an academic field of study has evolved in the span of a century. As the new millennium approaches, collegiate aviation will be called upon to prepare a new generation of highly skilled workers. These workers need to be educated by current and future generations of aviation faculty members. The purpose of this study was to examine the U.S. collegiate aviation workforce to determine if the next generation of faculty members is prepared. A descriptive study survey questionnaire was used to collect data for this study which was sent to UAA institutional members in order to ascertain their workforce needs. The study found that a significant amount of hiring for qualified aviation faculty members is already occurring. The survey results also indicated a substantial number of retirements is either taking place or is anticipated to take place by the year 2000. A significant finding was that almost all of the respondents believe the public at large does not have an adequate understanding of collegiate aviation.

9. J.M. Clark, (2004), "A descriptive research survey study that examined factors influencing selection of four-year post-secondary commercial aviation programs," UMI No. AAT 3136219.

The purpose of this survey study was to determine the factors that influence student selection of a four-year post-secondary commercial aviation program. Additionally, this study attempts to determine if there is a difference in factors based upon gender and race that affects the decision to enroll in four-year post-secondary commercial aviation programs. This descriptive research survey study was designed to examine student selection of four-year post-secondary commercial aviation programs. This study used a survey instrument to determine student selection of four-year post-secondary aviation programs. Specifically, the primary focus was to collect data from aviation students regarding choice factors in enrolling in four-year post-secondary institutions. The survey method allowed the researcher to collect data from students enrolled in four year post-secondary aviation programs to determine the current influential factors of student selection. In addition, the study examined enrollment data by gender and race of students in 23 four-year post-secondary aviation programs.

Findings suggest that the factors that influence selection of a four-year post-secondary aviation program are the same for all aviation students. The sample is more homogenous than heterogamous. The students that are drawn to four-year post-secondary aviation programs are there simply for aviation. Specifically, the study results suggest that students enroll in four-year post-secondary aviation programs because they want to be a pilot (62.6%). Aviation is what attracted students to four-year post-secondary aviation programs. Additionally, the ten most frequently selected factors recorded as very influential; program and institutional characteristics that attract students to collegiate aviation were program educational quality, university reputation, condition of equipment, institutional educational quality, location of institution, small class size, safety concerns, program characteristics, student to faculty ratio, and distance from home. This information is especially helpful to collegiate aviation programs that recruit students to their institution. In return, there will be a more diverse population in four-year post-secondary aviation programs. Educating a more diverse aviation population will increase diversity of pilots flying for major airlines.

### **Aviation Education Content Delivery and Enhancements**

1. Deak Arch and Mark Sherman, "The Use of Technology in Collegiate Aviation Programs," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 9-24.

With introduction of TAA and advanced Global Positioning Systems (GPS), a blind survey was designed to measure the extent of technology utilized in collegiate aviation programs. UAA member institutions completed an online Likert Scale survey focusing on the perception of technology utilization within each aviation program. The survey questioned respondents regarding technology support, aircraft cockpit design, classroom accessories, internet resources, training facilities, and other miscellaneous areas regarding technology. The study was designed to aid university administrators when planning future technology implementation.

2. C. Daniel Prather, "Distance Learning in Collegiate Aviation: Meeting the Needs of Airport Professionals," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 132-147.

Distance learning, referring to those courses which can be completed via the computer and internet while entirely absent from the traditional classroom, is increasing in popularity among both students and academic programs. Although (as of Spring 2006 course offerings) 24 institutions currently offer on-line aviation academic courses, this equates to only 21 percent of the institutions in the most recent Collegiate Aviation Guide (Prather, in press). As the demand for distance learning continues to grow, especially among non-traditional students, it is useful to consider the demand among airport professionals for aviation distance learning courses and degrees. A mixed mode survey with multiple contacts was distributed to a randomly selected sample of 200 members of AAAE during Fall 2005 and Spring 2006. A response rate of 52 percent revealed that many airport professionals view distance learning as affordable, convenient, flexible, of reasonable quality, and impersonal. Additionally, many are interested in pursuing distance learning but are unaware that complete aviation degrees can be completed on-line, and feel that more universities should offer aviation degree programs via distance learning. An adult university cannot be campus-bound, rather its borders must be defined by the lives of its students. (Sperling, as cited in Lehrer and Connolly, 1994, p. 13)

3. D. Scott Worrells, "Characteristics of Cooperative Education and Internship in Aviation Management Program," Collegiate Aviation Review, vol. 24, no. 1 (September 2006), pp. 166-179

Cooperative education and internship are separate and distinct means of providing students with a work-based learning experience. Traditionally speaking cooperative education is a means by which students acquire real work experience through actual employment that is similar, if not identical, to their intended career field. Internship traditionally exposes students to the working environment. Over time these differences have become blurred and in many cases the terms are used synonymously. The purpose of this study was to determine to what extent practitioners in Aviation Management programs differentiate between cooperative education and internship. The study was delimited to: community colleges, colleges, and universities affiliated with the UAA having AVM programs that participate in cooperative education and/or internship.

4. G.L. Schwab, "Comparison of Student Success in Different Technology-based Classrooms," Collegiate Aviation Review, vol. 20, no. 1 (September 2002), pp. 61-74.

Department of Aerospace Technology faculty questioned whether students were benefiting from the new technology that came with the opening of a new state-of-the-art classroom facility. The purpose of this quasi-experimental study was to compare scores of students using advanced technology course delivery methods with the scores of the students using the older course delivery methods as measured by overall class final scores. Two groups of students were presented identical lessons, one via traditional methods delivery. The other group received instruction using all classroom technology options available. The same instructor provided instruction to both groups. The results of the study support the alternative hypothesis in that there was a statistically significant difference at the .05 level between the students' mean grades using the two different course delivery methods at the two facilities. Students who received the same teaching materials but using the newer technology showed a statistically significant higher score as compared to those students who completed the same course work using the traditional methods.

5. N.N. Scarpellini and B.D. Bowen, "Evaluation and Action: Sustaining Excellence in Collegiate Aviation Distance Education," Collegiate Aviation Review, vol. 19, no. 1 (October 2001), pp. 140-167.

This study assesses the role of the evaluation process in sustaining and developing quality distance education programs in collegiate aviation. Distance education encompasses distance learning and distributive learning as well as e-learning and multiple method crossover delivery that includes some form of electronic delivery. The research explores the sanctioned position of evaluation procedures and their practical application in the outcomes assessment process within collegiate aviation distance education programs as compared to traditional delivery methods. Additionally, the study investigates the criteria for determining outcomes assessment based on establishing methods for interpolating contact hours, applied testing, and gauging learning. The methodology includes a literature review and a survey instrument implemented by semi-structured phone interviews. The gathered data are based on a review of accredited graduate and undergraduate collegiate aviation distance programs. The findings demonstrate that evaluation is an underutilized method for sustaining and ensuring a high-level academic product is delivered via distance education. The lack of consistent terminology for classifying and measuring distance education, and more specifically, the meaning of quality, further complicate this. Further research is recommended in order to reach a consensus on defining vocabulary of distance education elements and the role and application of evaluation. Additionally, the recommendations provide guidance in modifying the curriculum for achieving consistent results commensurate with accreditation standards.

6. T.J. Bliss, "Designing a Creative Context That Fosters Student Motivation and Engagement in Learning," Collegiate Aviation Review, vol. 20, no. 1 (September 2002), pp. 9-16.

Student attitudes and motivation play a significant role in their literacy learning (Turner & Paris, 1995). Good educators intrinsically know that the nature of motivational change depends, to a large extent, on the characteristics of the learning environment. When teaching students to become literate, it is important to balance affective and cognitive aspects of literacy

development. One way to achieve this balance is to create integrated instruction contexts that foster student motivation and engaged learning. This article describes an activity-based integrated aviation history context aimed at increasing student motivation and engagement in learning. This learning context is designed around multidisciplinary aviation themes in which curricular areas such as history, science, and mathematics are taught at the same time. It encompasses seven different instructional characteristics designed to engage students and cultivate greater learning environments. Contexts that are intellectually stimulating and active places of learning pose challenging and developmentally appropriate problems for students. The learning environment should set up relevant investigations and encourage students to think about the results of these investigations. Inferences about student achievement, potential, motivation, and literate ability are made by assessing student work generated in the creative context.

7. J.F. Clark, "Teaching the Pilots of the New Millennium: Adult Cooperative Education in Aviation Education," Collegiate Aviation Review, vol. 19, no. 1 (October 2001), pp. 29-40.

Aviation is a dynamic field that requires great dedication on the part of those who choose professional flying for their careers. Students must acquire a great amount of knowledge to include technical data, procedural information, social skills and more. There is much for the potential aviator to learn; sometimes it seems overwhelming to the initiate. One means of learning this vast amount of information involves the technique of cooperative education. The mixing of adult educational techniques and cooperative learning may be particularly useful in aviation. Using cooperative education in acquiring the required knowledge can teach them discipline and social skills required in surviving today's active aviation environment. The challenge then becomes one for the college-level aviation instructor. This paper addresses techniques for teaching potential pilots the fundamentals required for the job based on adult and cooperative educational techniques.

8. T.N. Sledge, (2004), "A comparison study of the effectiveness of instructional delivery techniques in commercial aviation classes," UMI No. AAT 3121781.

The primary purpose of this study was to provide information on the effectiveness of using technology in teaching an Introduction to Aviation class to university students. Students in two sections of Introduction to Aviation were presented lecture material in different media formats. The fall section received all course information from lectures using overhead projectors and transparencies. The spring section received the same information from lectures using PowerPoint presentations. The course was divided into five blocks of instruction. The section that received PowerPoint presentations had a progressively more sophisticated version using more sound, color, and motion with each new block of instruction. Five true-false/multiple-choice tests were given to each section. Test scores from the two sections were compared using independent t -tests. ACT scores from the fall and spring sections were also compared using independent t -tests to determine if the two groups were similar in academic aptitude.

Attendance records of the two sections were also compared using independent t -tests. A major finding of the study indicates there was no statistical difference between the test scores of the two sections. The spring section that received PowerPoint presentations did show a statistically significant improvement in attendance. The following conclusions were drawn from the results of this study: 1) PowerPoint presentations do not have either a positive or negative impact on the amount of student learning that occurs in the classroom when compared to using traditional forms of media such as the overhead projector and transparencies; and, 2) using PowerPoint presentations with lectures probably improves attendance rates. Students may find PowerPoint more attractive due to its use of sound, motion, and color.

9. R.R.C. Yates, (2005), "Analyzing traditional-based teaching methods versus technology-based teaching methods in collegiate aviation classrooms," UMI No. AAT 3171963.

This study is a comparative analysis of traditional-based teaching methods versus technology-based teaching methods in collegiate aviation classrooms. Education is in a transformational period. Technology use in the classroom is a major part of this transformation. However, this change in pedagogy is not occurring as rapid as one might believe. Out of ten undergraduate professors in the United States teaching in higher education, fewer than two seriously use computers and other technologies in their classrooms. Of the ten, four to five professors never use the machines at all. The same is true in collegiate aviation classrooms; technology-based teaching methods and technology use in the classroom for instructional purposes are in the early stages. This study was conducted at a Florida university. The population was aviation students enrolled in a Florida university aeronautics program. The sample consisted of students enrolled in the technology-based teaching methods course in the spring of 2004. The same course was taught once with traditional-based teaching methods in the spring of 2003. Ex-post facto data was used from the spring 2003 course. The main purpose of the study was to understand how technology-based teaching methods affect student's overall final grade performance in an aviation course at a Florida university. In the study, the final grade averages of the traditional based teaching methods course were analyzed between the technology-based teaching methods course. The students' perceptions of technology-based teaching methods were correlated with their final grades, and a correlation analysis was run between the students' final grade and their total flight time experience as measured in flight hours.

The results of the statistical tests did not yield a statistic at the .05 alpha level or higher. However, perception survey question #5 did yield a .042 alpha level. The researcher concludes that technology-based teaching methods may not always improve a students' performance in the class but, it will not diminish a students' performance. The researcher also concludes that if a student perceives technology is useful in learning school subjects, then that student will perform better in the specific aviation class than another student who does not believe technology is useful in learning. However, students' perceptions of technology need to be investigated further. The researcher recommends that a qualitative and quantitative research study should be conducted to better understand the coursework performance of aviation students before and after they become certified flight instructors in a collegiate aeronautics program.

## E. SUMMARY OF LITERATURE REVIEW

The material included in this literature review provides a wealth of information relating to aviation education. The amount of published aviation education material is significantly larger than what was included in the TTI report, leading one to conclude that there is widespread acceptance of aviation as a legitimate academic field. Aviation's stature as an academic field has also been enhanced by the Airport Cooperative Research Program which is funded by the FAA and administered by staff at the TRB. This program has funded millions of dollars of aviation research in a variety of areas. It has also provided much needed research dollars to strengthen university aviation programs and their partnerships with industry.

There is little doubt that aviation programs of all kinds and at all levels will need to work together to establish relationships and create partnerships to help train the workforce of tomorrow. Collectively, the resources included in this document represent the expertise of numerous aviation and education professionals who provide their experience and insight on matters ranging from course development and program curricula to student retention and career pathway development. They include the key topics of coursework, internship programs, recruitment and retention issues, program quality issues, and the preparation of students for careers with a variety of organizations including airports, airlines, FBOs, and consultants. While earlier material focused on program and curricula, more recent additions to the body of knowledge include assessing and improving such programs and adapting to the fast-changing technology that is typical in the aviation field.

The peer-reviewed material is categorized according to one of six different categories that further organizes the material into a useful manner. In some cases articles could be included in more than one category but was placed in the one that fit best. These categories include: Aviation Education – General; Aviation Education – Curriculum; Aviation Program Development and Assessment; Career/Employment Pathway Development; Aviation Program Recruitment/Retention; and Aviation Education Content Delivery and Enhancements.

The literature found in the "Aviation Education – General" category centers on more basic aviation program information. It includes articles on factors affecting students' decisions to attend aviation programs to preparation for careers managing airports. It also contains materials addressing educational requirements for certain job categories and graduate programs in aviation. Other articles address the differences between two- and four-year programs in some aviation areas and differences between aviation and non-aviation students altogether.

The literature in the "Aviation Education – Curriculum" category focuses on curriculum issues at aviation programs. These range from articles on specific courses to entire curriculums and how they serve the students and prepare them for the profession. It also includes material assessing the curriculums from the stakeholder perspective.

The literature in the "Aviation Program Development and Assessment" category includes articles written about the process and value of accreditation. This is a key element for programs going forward as it ensures the value of education in the workplace and, in essence, the value of the aviation program. Achieving and maintaining accreditation is important for any program as it seeks partnerships and pathways with the professions they serve. Additional articles address the definition of aviation management while several others focus on the development of specific

aviation programs/models and the assessment of existing programs. Several dissertations are in this category and involve quality and performance assessments of programs and their students. This provides a signal that this is an emerging research area and one of interest to the aviation community. As aviation higher education matures as a discipline, the focus in the literature will naturally move from definition and development to assessment and improvement.

The articles in the "Career/Employment Pathway Development" category focus on literature that provides a pathway or connection to industry and employment. The material predominantly pertains to internships and their structure and value. This includes internship programs for both flight and management students. Other articles in this category focus on industry perspectives regarding aviation programs, providing industry role models for students, and employment in the aviation profession. Employment-related articles include job placement and an airport manager's task analysis. This category also includes several dissertations indicating a recent and increased focus on the education/profession connection.

The literature in the "Aviation Program Recruitment/Retention" category focuses on encouraging students to enroll in the program and, once they are there, to stay enrolled. This is no easy task as the costs associated with aviation flight programs are staggering and can be an obstacle to enrollment and retention. Other articles address more specific interests such as attracting and retaining women in aviation programs and careers.

The final category, "Aviation Education Content Delivery and Enhancements", focuses on how changes in educational delivery have been addressed by aviation programs. The use of technology in the classroom as well as distance learning programs have come to the aviation education milieu. Articles address innovations in the classroom, designing creative environments to facilitate learning, and teaching pilots of the new millennium. This topic/research area is likely to be a growing one as technology advancements have dictated a wholesale change in how we do business and deliver services. Generation Y, or the Millennials, have grown accustomed to utilizing technology in everything they do as they have grown up in the internet/web-based era. Teaching and communicating with them requires creativity and innovation in the future. All educational programs must adapt to the changing technology and make the best use of it for their respective disciplines. These articles address some of these changes and challenges. Two dissertations in this category examine instructional delivery methods in aviation courses.

This literature review includes a comprehensive collection of aviation education material and resources addressing program development, assessment, curriculum, student retention, and delivery issues and challenges. It provides an array of insight into the many facets of aviation programs and the professional opportunities that exist for their students. The industry is a fast growing and changing one that depends on an educated and skilled workforce. Despite the economic difficulties and challenges faced by airlines and airports, the fact remains that significant growth is expected in passenger enplanements in the years to come. This growth will demand a workforce that is suited to its environment and up to the challenges.

The debate of the academic legitimacy of aviation programs is over. The questions that now remain are how it is going to be provided (administratively/organizationally/structurally) and who will provide it (public/private universities/colleges). This will ideally be answered by a multi-level approach by existing and new entities to deliver the education and training required. It will also require strategic partnerships among these entities and industry partners to be successful. This will likely continue to be a combination of specialty schools, two-year schools, and four-year schools in conjunction with participation from the private sector which will employ these graduates. The need for these programs and their benefits to the industry is well established. For states and regions with economies reliant upon aviation and aerospace jobs, this need and its benefits are even more compelling. As the project team moves forward, these resources will be utilized in tasks ahead. They will provide the foundation for which the *Strategic Business Plan* will be formulated.