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COLLEGIATE AVIATION REVIEW

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No juried publication can excel, unless experts in the field serve as anonymous reviewers. Indeed, the ultimate guarantors of quality and appropriateness of scholarly materials for a professional journal are the knowledge, integrity, and thoroughness of those who serve in this capacity. The thoughtful, careful, and timely work of the Editorial Board and each of the following professionals added substantively to the quality of the journal, and made the editor's task much easier. Thanks are extended to each reviewer for performing this critically important work.

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STATEMENT OF OBJECTIVES

The *Collegiate Aviation Review* is published annually by the University Aviation Association. Papers published in this volume were selected from submissions that were subjected to a blind peer review process, and were presented at the 2006 Fall Education Conference of the Association.

The University Aviation Association is the only professional organization representing all levels of the non-engineering/technology element in collegiate aviation education. Working through its officers, trustees, committees and professional staff, the University Aviation Association plays a vital role in collegiate aviation and in the aviation industry.

The University Aviation Association accomplishes its goals through a number of objectives:

To encourage and promote the attainment of the highest standards in aviation education at the college level.

To provide a means of developing a cadre of aviation experts who make themselves available for such activities as consultation, aviation program evaluation, speaking assignments, and other professional contributions that stimulate and develop aviation education.

To furnish a national vehicle for the dissemination of knowledge relative to aviation among institutions of higher education and governmental and industrial organizations in the aviation/aerospace field.

To foster the interchange of information among institutions that offer non-engineering oriented aviation programs including business technology, transportation, and education.

To actively support aviation/aerospace-oriented teacher education with particular emphasis on the presentation of educational workshops and the development of educational materials in the aviation and aerospace fields.

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for the

2007 UAA Fall Education Conference

and the

Collegiate Aviation Review (CAR)

Both qualitative and quantitative research manuscripts are acceptable. All submissions must be accompanied by a statement that the manuscript has not been previously published and is not under consideration for publication elsewhere.

All authors will be required to sign a "Transfer of Copyright and Agreement to Present" statement in which (1) the copyright to any submitted paper which is subsequently published in the ***CAR*** will be assigned to the University Aviation Association (UAA) and in which (2) the authors agree to present any accepted paper at a UAA conference to be selected by the UAA, if requested.

Authors should submit **five** double-spaced copies of the manuscript, conforming to the guidelines contained in the *Publication Manual of the American Psychological Association*, 5th Ed. (APA). If the manuscript is accepted for publication, the author(s) will be required to submit the manuscript on 3½-inch computer disk, or via e-mail to the editor, in Microsoft Word format. Papers accepted for publication must be submitted in "camera-ready form" by the prescribed deadline. *Authors should use the previous year's CAR for guidance in format and page layout.*

The UAA review process incorporates editorial input and recommendations from "blind" peer reviewers. A list of all reviewers is available from the ***CAR*** editor and is published annually in the ***CAR***.

All manuscripts must be postmarked no later than November 1, 2006 (Spring Issue) or May 1, 2007 (Fall Issue), and should be sent to:

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1401 Aviation Drive
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Questions regarding the submission or publication process may be directed to the editor at (765) 494-9964, or may be sent by email to: rofanjoy@purdue.edu

Students are encouraged to submit manuscripts to the ***CAR***. A travel stipend up to $500 is available for successful student submissions. Please contact the editor or UAA for additional information.

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ABSTRACT

With introduction of Technically Advanced Aircraft (TAA) and advanced Global Positioning Systems (GPS), a blind survey was designed to measure the extent of technology utilized in collegiate aviation programs. University Aviation Association (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.

INTRODUCTION

The University Aviation Association (UAA) is a nonprofit organization consisting of 115 institutions representing academic and aviation industry with over 800 members. The UAA has strengthened aviation education and training within collegiate setting through scholarships, research, and student support. The organization provides a strong liaison between collegiate aviation and industry and continues to be at the forefront of aviation education and training improvement. Currently, there are 46 academic UAA member institutions providing aviation training and education.

UAA member institutions were selected for study participation due to their driving force within the aviation industry, leadership within the collegiate setting, and access to current technological advancements. This study was created to examine technology utilized within UAA member aviation programs. Respondents completed an online Likert Scale survey focused on their perception of technology used within UAA aviation programs. The focus of this study was to illustrate current technology trends and aid university administrators in future technology planning and implementation.

REVIEW OF LITERATURE

Past studies focused on effects of technology implementation upon transfer of learning. For example, Witiw and Kelly-Benjamin (1997) compared student performance in a technology-enhanced aviation meteorology course. They found the control group showed increased conceptual basic meteorology knowledge over two experimental groups. Howell, Denning, and Fizpatrick (2003) examined associated effects on university student achievement when provided with traditional printed lecture handouts versus electronically retrieved handouts. They found no statistical difference between electronic and traditional delivery of specific course materials.

Articles have focused on technology within classroom settings. Karp (2000) remarked on how computer-based training (CBT) and personal computer-based aviation training devices (PCATDs) aid in knowledge retention of aviation students. Burgener (2005) reported how technology implementation transfers digital video technology to overhead projectors in classroom settings. In “The Technological Revolution Comes to the Classroom,” Konza & Johnston (1991) wrote, “faculty members need to see how creative and effective teachers change the curriculum, their assignments, the arrangement of the classroom, and the ways students interact when they introduce technology into their courses” (p.10).

The internet has become an integral part within the higher education system. However, this technology has not been without limitations. Simmons (2005) addressed concerns utilizing internet-based resources for use during instruction of undergraduate airline management

courses. These concerns included information that was out-dated, unreliable, or not always available for retrieval.

With the emergence of technically advanced aircraft (TAA), technology has influenced the cockpit, as well as the classroom. This paper examined technology trends in UAA collegiate aviation programs.

TECHNOLOGY SURVEY

Forty-six UAA member institutions were invited by e-mail to participate in an online blind study consisting of twenty-two questions (See Appendix). The survey focused on different uses of technology within each institution's program. Seventy-three percent of UAA member institutions completed the online survey with seventy-nine percent of respondents being four-year institutions.

Various programs offered in collegiate aviation were represented. Ninety-seven percent of the 34 respondents offered aviation flight-training programs and eighty-five percent offered aviation management programs. Twenty-six percent offered aviation maintenance (Airframe and/or Powerplant Maintenance) programs. (See Table 1).

Respondents ranked university support in utilization of technology on a scale ranging from poor to excellent. Over eighty percent of respondents indicated support from university administration, deans, and chairs ranging from average to excellent. Only one institution reported poor support from the chair of the department. (See Table 2)

Respondents ranked aircraft technology and indicated their choice from strongly agreeing, to strongly disagreeing with selected statements. Sixty-one percent agreed technically advanced aircraft were utilized in their programs. Eighty-five percent of institutions polled indicated use of Global Positioning Systems (GPS). (See Table 3)

Questions concerning technology use in the classroom were solicited. One hundred percent of respondents indicated they talked about aircraft technology in the classroom. Eighty-two percent indicated demonstrating aircraft technology with computer programs in the classroom. (See Table 4)

Participants were polled on technology use in classroom settings. Seventy-eight percent indicated computers were installed within the classroom. Ninety percent of respondents indicated installed VCRs, ninety-three percent indicated installed DVDs, and eighty-one percent indicated having LCD projectors within the classroom setting. (See Table 5)

Concerning software utilization, eighty-four percent indicated they were using some type of training program (Microsoft Flight Simulator®, Elite®, Jeppesen Sim Charts®, etc.). Fifty-seven percent indicated use of technical training software such as Vector Aircraft Systems®, aircraft system CBT training, etc. (See Table 6).

Next addressed were class management tools available to instructors. Ninety-three percent indicated use of PowerPoint®, seventy-five percent indicated use of WebCT® or Blackboard®, and sixty-one percent conduct online quizzes. Fifty-eight percent conducted online assessments and sixty-five percent use online services to distribute class syllabi. Sixty-seven percent utilized WebCT® or Blackboard® to distribute documents used in the course including lecture outlines, handouts, and website links associated with classroom content. Fifty-eight percent used some sort of multimedia presentation (Avi, Quicktime®, mpeg, etc.); however, less than fifteen percent used 16mm films and filmstrips. (See Table 7)

Table 1. *Training Programs*

Training Programs Offered	Percentage of Respondents	Number of Respondents
Aviation Flight Training	97.06%	33
Aviation Management	85.29%	29
Aircraft Maintenance	26.47%	9
Other (Not Listed)	20.59%	7
Air Traffic Control	17.65%	6
Avionic Maintenance	14.71%	5
Human Factors/Safety	8.82%	3

Table 2. *Support Received in Utilization of Technology*

Support Received in Utilization of Technology					
	Excellent	Good	Average	Fair	Poor
University Administration	34.38% (11)	31.25% (10)	18.75% (6)	15.63% (5)	0%
Deans	43.75% (14)	21.88% (7)	18.75% (6)	15.63% (5)	0%
Chairs	53.13% (17)	25.00% (8)	12.50% (4)	6.25% (2)	3.13% (1)

(Number of respondents are indicated inside of the parenthesis.)

Table 3. *How Technology is Involved*

How Technology is Involved – Aircraft					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Technologically Advanced Aircraft Utilized	29.41% (10)	32.35% (11)	20.59% (7)	11.76% (4)	5.88% (2)
Performance Management System	12.90% (4)	12.90% (4)	38.71% (12)	22.58% (7)	12.90% (4)
Flight Management Systems	18.18% (6)	18.18% (6)	39.39% (13)	12.12% (4)	12.12% (4)
GPS / RNAV / Loran	50.00% (17)	35.29% (12)	8.82% (3)	2.94% (1)	2.94% (1)

(Number of respondents are indicated inside of the parenthesis.)

Table 4. *Classroom Aircraft Technology*

Classroom Aircraft Technology					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Talk About Aircraft Technology	68.75% (22)	31.25% (10)	0%	0%	0%
Demonstrate Aircraft Technology With Computer Programs	38.24% (13)	44.12% (15)	17.65% (6)	0%	0%
Do Not Talk About Aircraft Technology	0%	0%	6.67% (2)	26.67% (8)	66.67% (20)

(Number of respondents are indicated inside of the parenthesis.)

Table 5. *PC Based Technology*

PC Based Technology					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Classroom Installed Computers	63.64% (21)	15.15% (5)	12.12% (4)	9.09% (3)	0%
Classroom Installed VCR	75.00% (24)	15.63% (5)	6.25% (2)	3.13% (1)	0%
Classroom Installed DVD	75.76% (25)	18.18% (6)	3.03% (1)	3.03% (1)	0%
Classroom Installed LCD Type Projector	67.65% (23)	14.71% (5)	8.82% (3)	2.94% (1)	5.88% (2)
Portable LCD Type Projector	46.88% (15)	18.75% (6)	15.63% (5)	6.25% (2)	12.50% (4)
Multimedia Projection Booth in Classroom	30.30% (10)	24.24% (8)	18.18% (6)	9.09% (3)	18.18% (6)

(Number of respondents are indicated inside of the parenthesis.)

Table 6. *Software*

Software					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Utilized With Simulated Training Programs	61.76% (21)	23.53% (8)	14.71% (5)	0%	0%
Technical Systems Software Utilized	42.42% (14)	15.15% (5)	24.24% (8)	15.15% (5)	3.03% (1)

(Number of respondents are indicated inside of the parenthesis.)

Table 7. *Instructor Class Management Tools*

Instructor Class Management Tools					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
PowerPoint Presentations	82.35% (28)	11.76% (4)	2.94% (1)	2.94% (1)	0%
Blackboard / WebCT Utilization	51.52% (17)	24.24% (8)	12.12% (4)	6.06% (2)	6.06% (2)
Blackboard / WebCT Utilization for Online Quiz	41.18% (14)	20.59% (7)	20.59% (7)	11.76% (4)	5.88% (2)
Blackboard / WebCT Utilization for Online Assessment	35.29% (12)	23.53% (8)	23.53% (8)	8.82% (3)	8.82% (3)
Blackboard / WebCT Utilization of Syllabi	40.63% (13)	25.00% (8)	18.75% (6)	6.25% (2)	9.38% (3)
Blackboard / WebCT Utilization of Course Documents	41.18% (14)	26.47% (9)	17.65% (6)	5.88% (2)	8.82% (3)
Faculty Issued Computers / Laptops	58.82% (20)	14.71% (5)	14.71% (5)	8.82% (3)	2.94% (1)
Dry Erase Boards in Classrooms	65.63% (21)	18.75% (6)	0%	6.25% (2)	9.38% (3)
Smart Boards in Classrooms	12.90% (4)	16.13% (5)	22.58% (7)	22.58% (7)	25.81% (8)
Chalk Boards in Classrooms	20.59% (7)	20.59% (7)	23.53% (8)	17.65% (6)	17.65% (6)
Transparencies Utilized in Classroom Presentations	26.47% (9)	38.24% (13)	14.71% (5)	11.76% (4)	8.82% (3)
Videos Utilized in Classroom Instruction	64.71% (22)	29.41% (10)	5.88% (2)	0%	0%
DVDs Utilized in Classroom Instruction	67.65% (23)	23.53% (8)	8.82% (3)	0%	0%
16 mm Films Utilized in Classroom Instruction	6.06% (2)	3.03% (1)	15.15% (5)	36.36% (12)	39.39% (13)
Film Strips Utilized in Classroom Instruction	8.82% (3)	5.88% (2)	11.76% (4)	32.35% (11)	41.18% (14)
Avi, Quicktime, mpeg, etc. Utilized in Classroom Instruction	29.41% (10)	29.41% (10)	23.53% (8)	5.88% (2)	11.76% (4)

(Number of respondents are indicated inside of the parenthesis.)

Table 8. *Student Issued and Mandated Utilization of Laptops*

Student Issued and Mandated Utilization of Laptops					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Mandated Utilization in Classroom Setting	15.15% (5)	15.15% (5)	9.09% (3)	24.24% (8)	36.36% (12)
Student Computer Integrated into Instructor Work Station	3.13% (1)	12.50% (4)	21.88% (7)	15.63% (5)	46.88% (15)
CBT Programs Specifically for Host Institution	12.12% (4)	24.24% (8)	21.21% (7)	15.15% (5)	27.27% (9)

(Number of respondents are indicated inside of the parenthesis.)

UAA institutions responded to questions regarding student issued laptops. Twenty-four percent indicated required mandatory use in the classroom setting. Thirty-three percent indicated student laptop integration with the instructor workstation. Thirty-six percent responded that computer based training programs were specifically licensed to the host institution. (See Table 8)

Questions were asked to measure utilization of PCATDs within the training program. Thirty-seven percent indicated use of PCATDs in accordance with approved Training Course Outline (TCO) for students to log time. Seventy-six percent of the respondents indicated use of PCATDs for increasing skill proficiency. Twenty-two percent of respondents reported charging for PCATD use. (See Table 9)

Respondents answered questions regarding simulator and/or flight training device (FTD) usage. Seventy-eight percent used simulators and/or FTDs able to simulate both single and multi-engine operations. Thirty percent used type specific simulation equipment. Fifty-nine percent used generic visual display systems. Fifty-five percent indicated use of sophisticated visual displays in their simulators and/or FTDs. Sixty-one percent used visual displays during student evaluation. Eighty-four percent used the simulator and/or FTD to log time creditable for the approved TCO. Fifty-eight percent used simulators and/or FTDs for student improvement without logging time in the training syllabus; however, forty-six percent charged students for use of simulators and/or PCATDs for these skill mastery opportunities. Sixty-four percent had GPS units installed in the simulator and/or FTD; while forty percent had technically advanced aircraft representations in the simulator and/or FTD. (See Table 10)

The survey questioned respondents about incorporation of an approved TCO. Eighty-four percent incorporated the TCO into the training program with only one institution indicating no TCO incorporated. Forty-two percent conducted 14 Code of Federal Regulations (CFR) Part 61 training at the institution. Thirty-six percent indicated that the student was able to choose between a 14 CFR Part 61 and a 14 CFR Part 141 training syllabus. (See Table 11)

Table 9. *Personal computer Aviation Training Device*

Personal Computer Aviation Training Device (PCATD)					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Time Logged Toward Rating (TSO Approved)	29.41% (10)	8.82% (3)	14.71% (5)	23.53% (8)	23.53% (8)
Unlogged Student Skill Mastery Opportunities	38.24% (13)	38.24% (13)	8.82% (3)	5.88% (2)	8.82% (3)
Time on PCATD Charged	11.76% (4)	11.76% (4)	20.59% (7)	8.82% (3)	47.06% (16)
Time on PCATD Uncharged	35.29% (12)	26.47% (9)	14.71% (5)	11.76% (4)	11.76% (4)

(Number of respondents are indicated inside of the parenthesis.)

Table 10. *Simulator/Flight Training Device*

Simulator / Flight Training Device (FTD)					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Generic Simulator / FTD Utilized	52.94% (18)	26.47% (9)	8.82% (3)	5.88% (2)	5.88% (2)
Type Specific Simulator / FTD Utilized	15.15% (5)	15.15% (5)	24.24% (8)	15.15% (5)	30.30% (10)
Generic Visual Displays in Simulator / FTD	31.25% (10)	28.13% (9)	15.63% (5)	6.25% (2)	18.75% (6)
Sophisticated Visual Displays in Simulator / FTD	38.24% (13)	17.65% (6)	11.76% (4)	14.71% (5)	17.65% (6)
Visual Displays Utilized During Training Evaluation	26.47% (9)	35.29% (12)	11.76% (4)	11.76% (4)	14.71% (5)
Time Logged Toward Rating (TSO Approved)	61.76% (21)	23.53% (8)	5.88% (2)	2.94% (1)	5.88% (2)
Unlogged Student Skill Mastery Opportunities	23.53% (8)	35.29% (12)	17.65% (6)	8.82% (3)	14.71% (5)
Unlogged Student Skill Mastery Opportunities – Charged for Time	20.59% (7)	26.47% (9)	17.65% (6)	5.88% (2)	29.41% (10)
Unlogged Student Skill Mastery Opportunities – Not Charged	11.76% (4)	5.88% (2)	23.53% (8)	29.41% (10)	29.41% (10)
GPS Installed in Simulator / FTD	44.12% (15)	20.59% (7)	8.82% (3)	8.82% (3)	17.65% (6)
Technically Advanced Aircraft Represented in Simulator / FTD	17.65% (6)	23.53% (8)	20.59% (7)	17.65% (6)	20.59% (7)

(Number of respondents are indicated inside of the parenthesis.)

Table 11. *Training Course Outline*

Training Course Outline (TCO)					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Incorporated into Training Program	63.64% (21)	21.21% (7)	12.12% (4)	0%	3.03% (1)
Part 61 Training Utilized by Institution	15.15% (5)	27.27% (9)	12.12% (4)	15.15% (5)	30.30% (10)
Student Choice of Part 61 / 141 Training	15.15% (5)	21.21% (7)	9.09% (3)	18.18% (6)	36.36% (12)

(Number of respondents are indicated inside of the parenthesis.)

Federal Aviation Administration (FAA) written testing facilities were addressed within the survey. Sixty-eight percent indicated utilizing a Laser Grade testing facility. Twenty-four percent indicated using a Computerized Aviation Testing Service (CATS) testing facility. Only one institution indicated using an AVTEST testing facility. (See Table 12)

Questions were poised to determine commonality of aviation-related resources at UAA member institutions. Forty percent of respondents indicated having a remote library separate from the main university library, devoted to aviation resources. Fifty-seven percent attested that the aviation library consisted of generic aviation resource materials. Sixty-four percent expressed library contained material specific to aviation programs offered by the university. Among these holdings, ninety percent agreed with having aviation textbooks and reading materials available for students in addition to aviation periodicals. Ninety-three percent reported having aviation reference materials available in the library for student use.

Eighty-one percent reported having multimedia holdings available for student use. (See Table 13)

Departmental computer assets and utilization were also included within the study. Ninety percent of polled institutions agreed with allowing students use of departmental computer assets. Seventy-two percent provided a stand-alone computer system for student use while ninety-six percent reported having internet capable student computers. Only one institution indicated not having an internet capable student computer available. Seventy-five percent expressed having FAA written test bank questions installed on departmental computers. Over eighty percent of respondents had word processing, PowerPoint®, spreadsheet, and data base software installed on departmental computers; however, two institutions indicated not having the software installed. (See Table 14)

All respondents indicated using some sort of IBM or a derivative of an IBM computer. No departments indicated using Macintosh (Mac) computers or Linux operating systems. Although a Likert Scale was utilized in the answering of the questions for this section, the researchers agree that a "yes/no" format would be more accurate when performing any replication of this survey. (See Table 15)

Inquiries were made concerning use of preflight weather stations. Seventy-eight percent had a weather station with aviation weather products available for student use. Eighty-seven percent had a telephone available for use during a preflight briefing and ninety-six percent had a personal computer (PC) available for weather briefings prior to flight. Although a Likert Scale was utilized in the answering of the questions for this section, the researchers agree that a "yes/no" format would be more accurate when performing any replication of this survey. (See Table 16)

Weather reporting services were examined. Seventy-seven percent strongly agreed with having an Automated Surface Observing System (ASOS) or Automated Weather Observing System (AWOS) located on the airport where student training was performed while forty-nine percent indicated having some sort of National Oceanic and Atmospheric Association (NOAA) weather reporting facility. Although a Likert Scale was utilized in the answering of the questions for this section, the researchers agree that a "yes/no" format would be more accurate when performing any replication of this survey. (See Table 17)

Table 12. *Federal Aviation Administration Testing Facility*

Federal Aviation Administration Testing Facility					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Lasergrade Testing Utilized	59.38% (19)	9.38% (3)	9.38% (3)	6.25% (2)	15.63% (5)
CATS Testing Utilized	21.88% (7)	3.13% (1)	21.88% (7)	6.25% (2)	46.88% (15)
AVTEST Testing Utilized	3.33% (1)	0%	26.67% (8)	13.33% (4)	56.67% (17)
Owned and Operated by the Aviation Department	56.25% (18)	6.25% (2)	15.63% (5)	6.25% (2)	15.63% (5)
Owned and Operated by University Testing Services	15.15% (5)	3.03% (1)	12.12% (4)	18.18% (6)	51.52% (17)
On Airport / University Property but Owned by Outside Entity	21.21% (7)	6.06% (2)	6.06% (2)	15.15% (5)	51.52% (17)

(Number of respondents are indicated inside of the parenthesis.)

Table 13. *Aviation Library*

Aviation Library					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Remote Library Separate from Main University Library Dedicated to Aviation	29.41% (10)	11.76% (4)	20.59% (7)	17.65% (6)	20.59% (7)
Generic to All Aviation	36.36% (12)	21.21% (7)	30.30% (10)	6.06% (2)	6.06% (2)
Program Specific Material (Flight, Maintenance, Management, etc.)	35.29% (12)	29.41% (10)	26.47% (9)	0%	8.82% (3)

(Number of respondents are indicated inside of the parenthesis)

Table 14. *Departmental Computer Assets*

Departmental Computer Assets					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Available for Student Use	72.73% (24)	18.18% (6)	0%	3.03% (1)	6.06% (2)
Stand Alone Student Computer System	51.52% (17)	21.21% (7)	9.09% (3)	3.03% (1)	15.15% (5)
Internet Capable Student Computers	84.85% (28)	12.12% (4)	0%	3.03% (1)	0%
FAA Written Test Bank Questions Installed	58.82% (20)	17.65% (6)	11.76% (4)	5.88% (2)	5.88% (2)
Word Processing Capable	82.35% (28)	8.82% (3)	2.94% (1)	2.94% (1)	2.94% (1)
PowerPoint Capable	85.29% (29)	11.76% (4)	0%	2.94% (1)	0%
Spreadsheet Capable	85.29% (29)	11.76% (4)	0%	2.94% (1)	0%
Database Capable	76.47% (26)	11.76% (4)	5.88% (2)	2.94% (1)	2.94% (1)

(Number of respondents are indicated inside of the parenthesis.)

Table 15. Type of Computers

Type of Computers in Department					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Macintosh	0%	0%	13.79% (4)	10.34% (3)	75.86% (22)
IBM or IBM Equivalent (Dell, Gateway, Hewlett Packard, etc.)	85.29% (29)	14.71% (5)	0%	0%	0%
Linux	0%	0%	10.34% (3)	20.69% (6)	68.97% (20)

(Number of respondents are indicated inside of the parenthesis.)

Table 16. *Aircraft Preflight Weather Station*

Aircraft Preflight Weather Station					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Generic Weather Station	12.12% (4)	12.12% (4)	18.18% (6)	15.15% (5)	42.42% (14)
Aviation Specific Weather Station	72.73% (24)	6.06% (2)	15.15% (5)	3.03% (1)	3.03% (1)
Phone Available for Preflight Briefing	81.82% (27)	6.06% (2)	9.09% (3)	0%	3.03% (1)
PC Available for Checking Weather (DUAT, Internet, etc.)	87.50% (28)	9.38% (3)	3.13% (1)	0%	0%

(Number of respondents are indicated inside of the parenthesis.)

Table 17. *On-Site Weather Reporting*

On-Site Weather Reporting					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
ASOS on Field	34.38% (11)	9.38% (3)	25.00% (8)	6.25% (2)	25.00% (8)
AWOS on Field	43.75% (14)	9.38% (3)	9.38% (3)	6.25% (2)	31.25% (10)
NOAA Weather Reporting Capabilities	37.50% (12)	12.50% (4)	18.75% (6)	9.38% (3)	21.88% (7)

(Number of respondents are indicated inside of the parenthesis.)

Table 18. *Aircraft Scheduling*

Aircraft Scheduling					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Individuals Employed to Schedule / Dispatch Aircraft	72.73% (24)	12.12% (4)	9.09% (3)	3.03% (1)	3.03% (1)
No Individual Employed to Schedule / Dispatch Aircraft	6.06% (2)	3.03% (1)	15.15% (5)	12.12% (4)	63.64% (21)
Aircraft Scheduled Using Paper Log	26.47% (9)	14.71% (5)	11.76% (4)	8.82% (3)	38.24% (13)
Aircraft Scheduled Using Computer(s)	54.55% (18)	18.18% (6)	12.12% (4)	3.03% (1)	12.12% (4)
Aircraft Schedule Available on Internet	42.42% (14)	9.09% (3)	18.18% (6)	9.09% (3)	21.21% (7)

(Number of respondents are indicated inside of the parenthesis.)

Respondents were questioned in regards to aircraft scheduling. Eighty-four percent indicated that a specific individual(s) was employed to schedule and/or dispatch training aircraft. Seventy-two percent used a computer to schedule training flights while only forty percent of the institutions utilized a paper log to schedule training aircraft. Fifty-one percent provided access to the training schedule via the internet. Although a Likert Scale was utilized in the answering of the questions for this section, the researchers agree that a "yes/no" format would be more accurate when performing any replication of this survey. (See Table 18)

Respondents were asked how they viewed the importance of technology within their training program. All respondents indicated that technology was important in the classroom as well as in the aircraft. The majority of respondents indicated that technology was important in support of the department; however, one institution replied it was of less

importance. The majority of institutions stated technology used in student support was important. (See Table 19)

Respondents were asked questions concerning future technology purchases. Eighty-one percent employed technology enhanced aids during student classroom instruction. Seventy-two percent utilized technology aids for the department. Sixty-two percent used technology-enhanced aids for student training. Twenty-eight percent utilized technically advanced aircraft in their programs. While forty-six percent indicated plans to purchase technically advanced aircraft, only forty-four percent used upgraded avionics. Thirty-eight percent planned to purchase upgraded avionics. Seventy-two percent used GPS or RNAV systems within their respective program. (See Table 20)

CONCLUSIONS

With over 800 members, the UAA has established itself as a nationally recognized leader among collegiate aviation institutions. The analyzed data in this study reflected UAA member institutions use of current technology.

Modern computer access was common within the classroom settings. Over seventy-five percent of UAA institutions utilized advanced computer technology including PowerPoint® Presentations, classroom installed computers, aircraft programs, simulated training software, and use of Blackboard® or WebCT®. In addition, computers were used by over half of the institutions to schedule aircraft and allow the schedule to be viewed on the internet. All UAA institutions polled indicated aircraft technology discussions within the classroom setting.

One of the most important statistics within this survey focused on use of technically advanced aircraft. Sixty one percent of the UAA institutions polled utilized technically advanced aircraft during the training of the students. These aircraft are equipped with the most modern avionics available on the market today.

Data presented by this study suggests that UAA member institutions keep up with current technology. The majority of UAA respondents felt that technology is very important in the classroom, aircraft, and department/student support system. This study demonstrated that UAA member institutions continue that leadership today within the technological realm by remaining on the forefront of technology innovations.

Table 19. *Importance of Technology*

Importance of Technology			
	Very Important	Important	Of Less Importance
Technology in the Classroom	88.24% (30)	11.76% (4)	0%
Technology in the Aircraft	81.82% (27)	18.18% (6)	0%
Technology Used in Supporting the Department	82.35% (28)	14.71% (5)	2.94% (1)
Technology Used in Student Support	76.74% (26)	17.65% (6)	5.88% (2)

(Number of respondents are indicated inside of the parenthesis.)

Table 20. *Future Technology Purchases*

Future Technology Purchases			
	Use	Plan to Buy	No Plans to Buy
Technology Aids in Classrooms	81.82% (27)	12.12% (4)	6.06% (2)
Technology Aids for Department	72.73% (24)	21.21% (7)	6.06% (2)
Technology Aids for Students	62.50% (20)	15.63% (5)	21.88% (7)
Technically Advanced Aircraft	28.13% (9)	46.88% (15)	25.00% (8)
Upgraded Avionics	44.12% (15)	38.24% (13)	17.65% (6)
GPS / RNAV Systems	72.73% (24)	15.15% (5)	12.12% (4)

(Number of respondents are indicated inside of the parenthesis.)

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APPENDIX

SURVEY

For each of the statements below, please indicate the extent of your agreement or disagreement by placing an X in the appropriate Column regarding your departmental utilization with technology

1. **Institution Classification**
   - 2 Year Program
   - 4 Year Program

2. **Select the Training Programs Offered by Your Institution**
   - Aviation Management
   - Aviation Flight Training
   - Avionic Maintenance
   - Aircraft Maintenance (Airframe and/or Powerplant)
   - Air Traffic Control
   - Human Factors / Safety
   - Other _____

3. **Support You Receive in Utilization of Technology**

University Administration	Excellent
Deans	Good
Chair	Average
	Fair
	Poor

4. **How is Technology Involved - Aircraft**

Technologically Advanced Aircraft Utilized	Strongly Agree
Performance Management System	Agree
Flight Management Systems	Neutral
GPS/RNAV/Loran/Etc	Disagree
	Strongly Disagree

5. **Classroom Aircraft Technology**

Talk About Aircraft Technology	Strongly Agree
Demonstrate Aircraft Technology With Computer	Agree
Programs	Neutral
Do Not Talk About Aircraft Technology	Disagree
	Strongly Disagree

6. **PC Based Instruction**

Classroom Installed Computers	Strongly Agree
Classroom Installed VCR	Agree
Classroom Installed DVD	Neutral
Classroom Installed LCD Type Projector	Disagree
Portable LCD Type Projector	Strongly Disagree
Multimedia Projection Booth in Classroom	

7. **Software**

Utilized With Simulated Training Programs (Microsoft	Strongly Agree
Flightsim, Elite, Sim Charts, Etc.)	Agree
Technical Systems Software (Vector Aircraft Systems,	Neutral
Aircraft Systems CBT Training, Etc.)	Disagree
	Strongly Disagree

8. **Instructor Class Management Tools**

PowerPoint Presentations	Strongly Agree
Blackboard/Webct Utilization	Agree
Blackboard/Webct Utilization for Online Quiz	Neutral
Blackboard/WebTV Utilization for Online Assessment	Disagree
Blackboard/WebTV Utilization of Syllabi	Strongly Disagree
Blackboard/WebTV Utilization of Course Documents (Lecture Outlines, Handouts, Course Links, etc.)	
Faculty Issued Computers/Laptops	
Dry Erase Boards in Classroom	
Smart Boards in Classroom	
Chalk Boards in Classroom	
Transparencies Utilized in Classroom Presentations	
Videos Utilized in Classroom Instruction	
DVD Utilized in Classroom Instruction	
16mm Films Utilized in Classroom Instruction	
Film Strips Utilized in Classroom Instruction	
Avi, Quicktime, mpeg, etc. Presentations Utilized in Classroom Instruction	

9. **Student Issued and Mandated Utilization of Laptops**

Mandatory Utilization in Classroom Settings (Notes, PowerPoints, Exam, Etc.)	Strongly Agree
Student Computer Integrated into Instructor Work Station	Agree
Computer Based Training Programs Specifically for Host Institution	Neutral
	Disagree
	Strongly Disagree

10. **PCATD**

Time Logged Per FAR Toward Rating (TCO Syllabus Approved)	Strongly Agree
Unlogged Student Skill Mastery Opportunities	Agree
Time on PCATD Charged	Neutral
Time on PCATD Uncharged	Disagree
	Strongly Disagree

11. **Simulator / FTD**

Generic Simulator/FTD Utilized (Capable of Simulating Multiple Aircraft Either Single or Multi Engine)	Strongly Agree
Type Specific Simulator/FTD Utilized	Agree
Generic Visual Displays in Simulator/FTD	Neutral
Sophisticated Visual Displays in Simulator/FTD	Disagree
Visual Displays Utilized During Training Evaluation	Strongly Disagree
Time Logged per FAR Toward Rating (TCO Syllabus Approved)	
Opportunity for Unlogged Student Skill Mastery Opportunity	
Unlogged Skill Mastery Opportunity Charged for Time Utilized	
Unlogged Skill Mastery Opportunity Not Charged for Time Utilized	
GPS Installed in Simulator/FTD	
Technically Advanced Aircraft Representation in Simulator/FTD	

12. **TCO**

Incorporated into Training Program	Strongly Agree
Part 61 Training Utilized by Institution	Agree
Student Choice Part 141/61 Training Syllabus	Neutral
	Disagree
	Strongly Disagree

13. **FAA Testing Facility**

Lasergrade Testing Utilized	Strongly Agree
Cats Testing Utilized	Agree
Avtest Testing Utilized	Neutral
Owned and Operated by Aviation Department	Disagree
Owned and Operated by University Testing Services	Strongly Disagree
On Airport / University Property but Owned by Outside Entity	

14. **Aviation Library**

Remote Library Separate from Main University Library	Strongly Agree
Dedicated to Aviation	Agree
Generic to All Aviation	Neutral
Program Specific Material (Flight, Maintenance, Management, Etc.)	Disagree
	Strongly Disagree

15. **Aviation Library Holdings**

Aviation Textbooks, Reading Books on Shelf	Strongly Agree
Aviation Periodicals on Shelf	Agree
Aviation Reference Material on Shelf	Neutral
Multimedia Holdings (VHS, DVD, 16 MM Films, Etc)	Disagree
	Strongly Disagree

16. **Departmental Computer Assets**

Available for Student Use	Strongly Agree
Stand Alone Student Computer System	Agree
Internet Capable Student Computers	Neutral
FAA Written Test Bank Questions Installed	Disagree
Word Processing Capable	Strongly Disagree
PowerPoint Capable	
Spreadsheet Capable	
Database Capable	

17. **Type of Computers in Department**

MAC	Strongly Agree
IBM or IBM Equivalent (Hewlett Packard, Compaq, Dell, Etc)	Agree
	Neutral
Lunix	Disagree
	Strongly Disagree

18. **Aircraft Preflight Weather Station**

Generic Weather Station	Strongly Agree
Aviation Specific Weather Station	Agree
Phone Available for Preflight Briefing	Neutral
PC Available for Checking Weather (DUAT, Internet, Etc.)	Disagree
	Strongly Disagree

19. **On Site Weather Reporting**

ASOS on Field	Strongly Agree
AWOS on Field	Agree
NOAA Weather Reporting Capabilities	Neutral
	Disagree
	Strongly Disagree

20. **Aircraft Scheduling**

Specific Individual(s) Employed to Schedule/Dispatch Aircraft	Strongly Agree
	Agree
No Specific Individual(s) Employed to Schedule/Dispatch Aircraft	Neutral
	Disagree
Aircraft Scheduled Using Paper Log	Strongly Disagree
Aircraft Scheduled Using Computer(s)	
Aircraft Schedule Availible on Internet	

21. **Importance of Technology**

Technology in the Classroom	Very Important
Technology in the Aircraft	Important
Technology Used in Supporting the Department	Of Less Importance
Technology Used in Student Support	

22. **Future Technology Purchases**

Technology Aids in Classroom	Use
Technology Aids for Department	Plan To Buy
Technology Aids for Students	No Plans To Buy
Technically Advanced Aircraft	
Upgraded Avionics	
GPS / RNAV Systems	

Pedagogical Approaches to Aviation Phraseology and Communication Training in Collegiate Flight Programs

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ABSTRACT

The purpose of this study was to determine how collegiate aviation programs in the United States provide aviation phraseology and communication training. Possible differences in pedagogical approaches when teaching aviation phraseology to native vs. non-native speakers of English were also explored. This work builds on literature (Day, 2004; Mathews, 2004; Philips, 1991; Prinzo & Britton, 1993; Ragan, 2002; Verhaegen, 2001) which suggests that failure to use standardized aviation phraseology, improper pilot/air traffic controller communications procedures, and lack of English language proficiency threaten flight safety. This study explored aviation phraseology and communication instruction curriculum in use at accredited university aviation flight programs. The study was conducted in two phases. In the first phase, administrative faculty from each of the sixteen Council on Aviation Accreditation (CAA) accredited flight programs completed an online survey. Faculty administrators from seventy-five percent of the accredited flight programs participated in a follow-up phase including two focus groups and one interview. While not generalizable to all flight training institutions, recommendations are discussed in terms of potential research applications for collegiate aviation programs.

INTRODUCTION

English has been chosen as the official language of flight in the United States and continues to be the recommended *lingua franca* for international use (Crystal, 1997). In some cases, a lack of English proficiency of pilots or controllers has led to disastrous and even fatal catastrophes. While miscommunications between flight crews and air traffic control (ATC) personnel may have been only one aspect of these incidents and accidents, the lack of ability for all parties involved to understand crucial directions via a common English may have been the most important contributing factor leading to these tragedies. Without agreed upon standards for English proficiency and common phraseology, the aviation industry continues to be at risk for future language related accidents (Day, 2004; Mathews, 2004; Philips, 1991; Prinzo & Britton, 1993; Ragan, 2002; Verhaegen, 2001).

Literature suggests that air traffic communications often deviate from standard phraseology in emergency situations towards a more conversational style. Since this phenomenon commonly occurs, an English proficiency beyond the basic understanding of aviation phraseology may be necessary (Mathews, 2004). In addition, a cultural awareness of the variety of English spoken in the country or countries encountered during flight may help avoid misunderstandings and miscommunications (Dyck, A., personal communication, December 8, 2001).

Statement of the Problem

Federal Aviation Administration (FAA) written examinations address some phraseology and communication procedures in a textual format, but do not provide an assessment of oral aviation English proficiency or actual communication performance. The only subjective measures of pilot communication performance are assessed by flight examiners during practical flight examinations (Nordwall, 1997).

Training in aviation phraseology and communication primarily occurs in initial ground and flight instruction. Actual aviation communication in the United States often deviates from prescribed phraseology. Even when strictly adhered to, FAA phraseology can differ from International Civil Aviation Organization (ICAO) recommended phraseology. Regional variations in usage may also occur and further complicate negotiation of meaning (Ragan, 2002).

At the time of this writing, new ICAO language policies which promote globalized standards of aviation phraseology had been adopted in 2004 and were slated for implementation in 2008 (ICAO, 2004).

Purpose of Study

The purpose of this investigation was to determine how collegiate aviation programs in the United States provide phraseology and communication training. Possible differences in pedagogical approaches when teaching aviation phraseology to native vs. non-native speakers of English were also explored.

METHODOLOGY

The study focused on the discovery of descriptive information regarding curriculum in collegiate aviation phraseology and communication flight training. An initial survey was followed up by focus groups and one interview. While not anticipated, the interview was conducted at the request of a subject who was unable to attend one of the focus groups, but still wished to participate in the study while on site at the UAA fall education conference.

Participants

University aviation flight programs which exemplify academic excellence in ab initio training were examined. The entire population of CAA member schools with accredited flight programs was selected. (*A full listing of the specific institutions is in Table A-1, located in the appendix.*) These programs were chosen because the schools have already passed rigorous accreditation protocols, have demonstrated excellence, and have met high standards criteria.**Methodology for obtaining accreditation is detailed on the CAA website* (Council on Aviation Accreditation, 2005).

Instrumentation

A survey instrument was created by the author to assess the curriculum of CAA member schools with accredited flight programs. This instrument attempted to determine the emphasis of phraseology and communication training in the university aviation environment.

Prior to the design of the survey, an Internet search was conducted along with content analysis of the websites to learn about general public information regarding the scope and general policies of the institutions to be surveyed. (*URLs for the program websites are listed in the references.*) The instrument was pilot tested with Purdue University flight faculty to insure the validity of the survey. The survey was also tested for technical stability with Purdue University IT staff before administering to the survey participants.

The online survey was estimated to take 10-15 minutes to complete and consisted of 22 demographic and curriculum based questions and 6 perception questions. Since the survey was administered via the Internet, authentication and security were provided by the assignment of a randomly generated five-digit unique ID for each institution. The survey site was only accessible with authentication via this ID.

Focus Groups

Two focus groups were conducted onsite at the 2005 University Aviation Association (UAA) fall education conference and an interview guide was developed to ensure standardization between groups. The two groups consisted of flight faculty and administrators from eleven of the sixteen CAA accredited flight programs. Some, but not all of the focus group subjects had also participated in the survey phase of the study.

Interview

Although not anticipated in the follow-up design, an interview was conducted in order to allow a subject who was in attendance at the UAA fall education conference but unable to participate in the scheduled focus groups to contribute to the study. Comments from the interview were aggregated with those of the focus groups to protect the anonymity of the participant.

RESULTS

Survey

Descriptive information about each program, such as student population demographics, admission requirements, etc., was collected from survey respondents and related to curriculum content and perception responses. Frequency and variety of curriculum content responses were categorized. Respondents were asked to answer all questions for the 2005-6

academic year unless otherwise specified. This time frame was selected to obtain a snapshot of current data which could be evaluated within and among programs.

Program Demographics Enrollment ranged from 150 to 1400 students with 75% of the programs reporting an enrollment of less than 350 students. *Figure A-1, located in the Appendix, provides a graphical illustration of enrollment by program.* Only 25% were larger programs with enrollments of more than 350 students. International student enrollment was low in all programs, ranging from one to forty-five students with 75% of the programs reporting fifteen or fewer international students. *Figures A-2, A-3, & A-4, located in the Appendix, provide graphical illustrations of the international student population by program.*

The survey provided 82 of the most frequently mentioned countries of origin for international students attending North American Colleges and Universities from which to choose and also provided an opportunity to add countries not listed (Purdue University International Students and Scholars, 2004, p. 6). *Refer to Table A-2, located in the the appendix, for a full listing of countries.* Notably, Japan had the highest frequency by far with twelve programs reporting international students from that nation. Significantly lower, but next in frequency were Brazil, Canada, France, and Germany, each with six programs reporting to have had students from these countries, and India, Jamaica, Saudi Arabia, and the United Kingdom, each with five programs reporting to have had students from these countries.

Participants were asked to specify the TOEFL (Test of English as a Foreign Language) score requirements for admission of international students and had options to answer for either or both the paper based test (PBT) or the computer based test (CBT) in the event that faculty administrators were familiar with only one scoring system and not the equivalent in the other format. Results are detailed in Table 1 below.

Table 1. *Program Minimum Acceptable TOEFL Score*

TOEFL PBT Score	Equivalent CBT Score	Number of Programs	Response Rate
400	97	0	0.00%
450	133	2	12.5%
500	173	7	43.75%
550	213	5	31.25%
600	250	1	6.25%
650	280	1	6.25%

Thirteen flight programs indicated the same TOEFL requirement as their institution. No flight programs made accommodations for lower TOEFL scores, but three programs indicated higher admissions requirements than their institution.

Program Curriculum To determine all possible courses within the curriculum that might impact aviation phraseology and communication training, the survey listed nine options and gave an opportunity to provide other courses not included in the list. Participants were instructed to choose all courses within the curriculum that they felt emphasized aviation phraseology and communication training. Multiple course responses were chosen by each program. Results are detailed in Table 2 below.

Table 2. *Aviation Phraseology and Communication Training Emphasis*

Courses	Number of Programs	Response Rate
Private ground	14	87.5%
Private flight	13	81.25%
Instrument ground	15	93.75%
Instrument flight	14	87.5%
Commercial ground	12	75.0%
Commercial flight	13	81.25%
Flight simulator	11	68.75%
Crew resource mgmt. (CRM)	12	75.0%
Air traffic control (ATC)	10	62.5%
*Other	1	6.25%

**Other: special aviation communication course*

Respondents were instructed to choose all aviation phraseology and communication standards currently taught in the program curriculum. Results are detailed in Table 3 below.

Table 3. *Communication Standards Emphasized*

Communication Standard	Number of Programs	Response Rate
FAA	16	100.0%
ICAO	8	50.0%
Airline industry	10	62.5%
Local and regional norms	1	6.25%
Other	0	0.0%

Programs were provided four options and given an opportunity to name specific textbooks utilized and specify resources not previously listed. Respondents were instructed to select all resources in use with multiple combinations of resources possible. Results are detailed in Table 4 below.

Table 4. *Aviation Phraseology and Communication Skills Instructional Resources*

Resource	Number of Programs	Response Rate
FAR/AIM	15	93.75%
ICAO manual of RTF	5	31.25%
ATC manual	8	50.0%
*Text book	3	18.75%
**Other	2	12.5%

**Text specified: Jeppessen **Other resources: Comm 1 software and instructor experience*

The survey provided three options for aviation phraseology and communication skills practice and gave an option to provide specific opportunities not previously listed. Participants could provide multiple responses and were instructed to select all categories that applied to their program. Results are detailed in Table 5 below.

Table 5. *Aviation Phraseology and Communication Skills Practice Opportunities*

Skills Practice Opportunity	Number of Programs	Response Rate
ATC/pilot computer simulation	13	81.25%
NIFA team participation	9	56.25%
CFI tutoring	10	62.5%
*Other	2	12.5%

**Other: language tutoring, internships and senior projects*

Twelve programs reported offering English language remediation. All of the potential respondents reported that the institution provided such instruction rather than the flight program. Respondents were provided five options of typical ESL instruction choices. Results are detailed in Table 6 below.

Table 6. *Type of English Language Instruction*

Instruction Offered	Number of Programs	*Response Rate
Aviation specific English	3	25.0%
General English	11	91.6%
Computer assisted (CAI)	4	33.3%
One-on-one tutoring	6	50.0%
Small group communication	3	25.0%
Other	0	0.0%

**Response Rate: percentage of 12 programs with ESL instruction*

Participant Perceptions The survey concluded with six perception questions with responses on a traditional five point Likert scale. Possible responses included: *strongly agree, agree, undecided/neutral, disagree,* and *strongly disagree.* For each question, respondents were asked to give their perception of the flight program.

Ground school instructors were perceived to most effectively promote the usage of standardized aviation phraseology, closely followed by flight training instructors and simulator instructors. All instructor categories had a median response of *strongly agree*. Experience of instructors was seen as a positive factor, but not strongly perceived to influence quality of aviation phraseology and communication training with a median response between *undecided/neutral* and *agree*.

In regards to how the flight program curriculum addressed aviation phraseology and communication instruction, respondents felt that the curriculum addressed industry jargon with a median response of *agree*; however, most participants were either ambivalent or did not feel the program had an adequate global perspective towards aviation communication with a median response of *undecided/neutral*.

Data Correlations In addition to analyzing the individual survey questions, responses which were anticipated to have a possible relationship in the design phase of the survey were correlated. Statisticians cautioned although the entire population was surveyed, such a small total population (N=16) may not yield statistically significant findings and all calculations should be viewed in context, since outliers could drastically alter outcomes. The statistical packages Systat and R were used to calculate correlations. The following correlations were done using Kendall's tau coefficient, a correlational method for ordinal variables. Spearman's rank correlation could have obtained qualitatively similar results; however, the coefficient was intended for use with continuous data that does not meet the assumptions of the parametric Pearson's correlation. Kendall's tau also accounts for ties in rank in the ordinal responses. Thus, if multiple participants selected the same response, the results of the analysis would not be biased. Spearman's correlation coefficient uses the average of the tied scores to account for this, but because such averages are meaningless for ordinal variables, it was a less preferable means of analysis (Conover, 1980).

The first correlation explored whether programs with a higher TOEFL score for admission tended to omit offering English language instruction. The assumption was that a higher TOEFL score might be seen as an adequate means for screening potential international students and those students with demonstrated English language proficiency may not need ESL remediation. The anticipated outcome that schools with higher TOEFL scores tended to not offer English language instruction proved to be significant as shown in Table 7 below.

Table 7. *TOEFL Score and English Language Instruction*

Kendall's tau	p-value	z-test
-0.5539117	0.02045	-2.318

p < .05 range of TOEFL score is significantly correlated to offering ESL instruction

Curriculum emphasis of ground school instruction was correlated with the perceived promotion of standardized aviation phraseology by the respective instructors. Although private and instrument emphasis/instruction did not demonstrate a relationship, commercial emphasis/instruction had a significant relationship as shown in Table 8 below.

Table 8. *Ground School Emphasis and Perceived Ground Instruction*

Ground School	Kendall's tau	p-value	z-test
Private	0.1852396	0.4631	0.7338
Instrument	0.3977058	0.1152	1.5755
*Commercial	0.8296298	0.001015	3.2865

*p < .05 *commercial ground school instruction is highly significant*

Focus Groups and Interview

Further discussions with administrative flight faculty from CAA flight programs occurred via two focus groups and one follow-up interview including 75% of the total population. In order to ensure standardization between topics discussed, an interview guide was developed. Each question led to group discussion on the topics which provided the following synthesized comments and thematic conclusions.

Curriculum Delivery In regards to standardized curriculum delivery, it was discovered that while many programs delegate English remediation to the larger institution, some programs have aviation specific language courses and even provide individual instruction and seminars for aviation students. The majority of programs charge flight instructors with the primary dissemination of aviation phraseology and communication knowledge. Many programs supplement this knowledge with a specific air traffic control (ATC) course. Simulation is also incorporated with dynamic software, such as Comm 1, which encourages correct pilot and air traffic controller communication and usage of standardized phraseology. In some programs, advanced courses continue emphasizing proper communication procedures by integrating instruction with flight training devices (FTDs) with appropriate usage of pilot/ATC communications. Most programs encourage standardized phraseology and clear communications in Crew Resource Management (CRM) courses. In these advanced pilot training situations, programs reported use of industry standard checklists and responses.

English Language Proficiency When determining English language proficiency for international students, most programs indicated a strong reliance on the Test of English as a Foreign Language (TOEFL) scores as a screening device for candidates admissions to programs. However, even when students had high test scores, some programs noted international students having difficulties with idioms and nuances of conversational English. Some programs reported conducting informal interviews between faculty and prospective international students to further assess English language skills. Once students are admitted to flight programs, language and communication skills are assessed during check rides with examiners and instrument proficiency checks (IPCs) with instructors. Simulation was presented as a helpful option for standardized student self assessment. Some programs reported incorporating ATC software that will not respond properly unless a student uses standardized phraseology. Usage of standardized phraseology is routinely encouraged in many programs by promoting practice with ATC tapes, performing pilot briefings which emphasize standardized phraseology, and using communication card templates for familiarization with standardized phraseology. In some cases, classroom instructors work with students on language proficiency. Other than performance evaluations during check rides, there was little means for assessing aviation

phraseology and communication proficiency levels of students in a structured standardized method.

International Student Demographics and Cultural Inclusion When discussing philosophies about recruitment of international students and strategies for inclusion of those students once admitted, most programs reported having a small percentage of international students. Cultural differences were noted, such as Asian students' tendency to respond affirmatively even if they do not understand or intend to comply with a directive. Participants also highlighted that when unexpected situations occur, people often revert to conversational language; however, non-native English speakers are primarily taught aviation specific phraseology and many are not able to function at a proficient level in general English outside of standardized communications.

Global Perspective towards Aviation When addressing the philosophies of the CAA flight programs about preparing students for future career paths which may lead to operating in international airspace and on international routes, programs reported that keeping track of alumni was difficult. All programs mentioned alumni association tracking at an institutional level, but individual flight programs did not report a formal standardized mechanism for tracking alumni. Most programs had faculty members who knew about individual graduates' progress. Some programs attempted to track alumni progress and kept current biographies of graduates, but participants noted the difficulties in keeping such data up to date as the alumni base is very transient. No participants reported keeping current statistical information on all program alumni. Strategies for keeping in contact with alumni included holding student/alumni banquets, doing exit and follow-up interviews with graduates to assess program needs, and enlisting key faculty and staff to ask for feedback from program alumni.

When asked to share opinions about program attitudes towards a global aviation perspective, some programs reported the advantage of close proximity to international airspace. Participants stated when flight students have the opportunity to fly outside the U.S., most commonly to Canada, Mexico, or the Caribbean, they gain a greater awareness of global differences. Unfortunately, many aviation students do not have the opportunity to fly internationally until after graduation, in many cases years later. One participant stated that the majority of their graduates will experience international flight after graduation in a corporate aviation environment. To try and fill the void in students' collegiate experience, flight faculty at many programs will teach by sharing international flight experiences with students, often highlighting communication concerns. Programs with international students reported that the interaction of U.S. and foreign students was insightful for both parties. Sensitivity to accents and regional differences was noted as a concern, even within the continental U.S. Many participants stated that with so many curricular mandates for flight programs, although important, a global perspective was not a high priority. Some participants felt that since English is the *lingua franca* of aviation and most flight program students are native speakers of English, there may be little need for emphasis on aviation English.

DISCUSSION

In regards to specific survey content, the author was surprised that so many international student countries of origin had at one time had representation at a CAA accredited flight program. With only sixteen programs, it was anticipated that many of the eighty-two countries listed would not be selected; however, only four of the eighty-two listed countries were not selected by at least one program. While this response is not representative of current student demographics, it does highlight the challenges that a varied international student base presents. Unlike contract programs where a large group of homogeneous students with similar first language backgrounds may come from a specific country to train in the U.S., the academic flight programs may find it hard to address concerns from the international students' first language perspective making curriculum design more difficult. When adding in native speakers of English, the curriculum design is even more complex.

In follow-up focus groups it was determined that most programs left tracking of alumni to institution based organizations such as a university alumni association or development office. This leads to a bigger issue of a reported overall lack of resources at the program level. Budgets dictate that faculty and staff duties must be prioritized and many things are delegated to larger institution infrastructure. This may serve short term financial concerns, but it may not address the best interests of the program in the long run. Strategic planning for future vision of flight programs can benefit greatly from program alumni input. While keeping addresses current, alumni association and development organizations may not be addressing program concerns.

CONCLUSIONS

The strategy for programs to use higher TOEFL admission scores as a means to avoid providing English language instruction had a high correlation. This option for screening is not necessarily valid as the PBT and CBT TOEFL do not currently have a means for assessing oral performance through spoken English. The new Ibt (Internet based test) will incorporate a test of spoken English and attempts to address oral proficiency better than currents tests which rely on reading and listening comprehension. The Ibt may cause another concern in that it may not be available in poorer countries without technological infrastructure.

The researcher posited anecdotal evidence that much flight training is conducted by student CFIs. While this view could not be substantiated in survey responses due to the aggregation of ground and flight instructor personnel types, the theory was supported in focus group discussions. This raises concerns for the lack of formal structure in curriculum for aviation phraseology and communication training. Newly trained student CFIs need a standardized method for conveying aviation phraseology and communication skills to students. This is especially important since new CFIs have just crossed over into the role of instructor and may be overwhelmed by the many flight training procedures which need to be taught to their flight students. Designing a standardized curriculum for the dissemination of this information will take pedagogical research. Again the author is confronted with concerns about program resources and priorities.

Program resources and priorities are an additional concern when it comes to outsourcing English language instruction and tracking of alumni. While larger institution organizations may have infrastructure in place to address major concerns such as general English proficiency and basic graduate demographic information, these organizations may not address specific program concerns. There may be opportunities to collaborate with university organizations to optimize resources. In the case of English language instruction, ESL specialists may have more experience working with a range of first language learning concerns. Perhaps flight program personnel could offer to provide an aviation context for ESL instruction. Likewise, many university alumni and development organizations may be able to work with programs to create tools to track alumni and gather better information for all parties involved. It may just take a commitment of time to explore possibilities for collaborative ventures. Most universities prefer to have a coordinated approach for communicating with alumni. There may be ways to utilize databases and other institution infrastructure and avoid duplicating efforts, thereby gaining resources.

From a philosophical perspective, the author is concerned about the lack of attention to native speakers of English in regards to aviation phraseology and communication curriculum. One should not assume that native speakers of English will encounter little difficulty with aviation phraseology and communication protocols just because these registers (a sociolinguistic term which according to Mesthrie, Swann, Deumert, & Leap, "...denotes variation in language according to the context in which it is being used" 2000, p. 72.) are predicated on the English language. The abbreviations, syntax, and lexicon, of radiotelephony is not structured like a natural language. While based on English words, learning aviation phraseology is much like learning a foreign language. Protocols must be learned along with norms for the speech community of the aviation industry.

ICAO has come furthest in addressing aviation phraseology standards by creating a model for holistic descriptors; however, the Proficiency Requirements in Common English (PRICE) study group did not come away with common assessment tools for oral communication performance in an aviation context or a standardized aviation phraseology and communication training curriculum. ICAO's holistic descriptors are a good first step, but without operationalizing these descriptors into a standardized curriculum they serve only as textual benchmarks. It will take resources and research study by some entity, be it academic, industry, or governmental, to take the next step in assessment and curriculum development for aviation phraseology and communication training.

RECOMMENDATIONS

Suggestions for future directions in academic curriculum and pedagogy involve a more formally structured approach, including possible incorporation of a standardized aviation specific phraseology and communication course in U.S. flight training programs. This could encompass Aviation English for both native and non-native speakers. Assumptions that native speakers of English do not need specific aviation phraseology and communications instruction may be naive. While ICAO language and communications policies currently slated for implementation in 2008 are primarily focused on general English language proficiency, competency in standardized aviation phraseology is also paramount for flight safety. Native speakers of English will have an advantage when encountering emergency situations in the event that communications revert to conversational English in lieu of standardized phraseology; however, failing to use proper phraseology and protocol, such as neglecting to declare a fuel emergency, may have disastrous outcomes such as those in the Avianca crash of 1991.

For non-native speakers of English, courses could ideally be tailored to address concerns from the perspective of the students' first language. This could be difficult, since the survey found that international students in the CAA accredited flight programs typically came from many different countries; therefore making this suggestion hard to structure into a standardized aviation curriculum. However, in cases where large groups of students come from the same country, as is the case in most contract programs, first language issues could be more easily addressed. Also in cases when ESL specialists are employed, these professionals should be more equipped to understand the learners' first language pedagogical issues. Strategies to address specific cultural issues could be implemented to enhance learning and address communication with the students' first language perspective in mind.

A structured approach to implementing aviation phraseology and communication training initiatives is crucial for successful assimilation into the professional pilot's skill set. To that end, emphasizing usage of standardized phraseology and communications protocol throughout the flight program curriculum is highly recommended. Perceptions of the participants surveyed reflected a need for higher quality of phraseology and communication instruction in early flight training with an emphasis on promoting usage of standardized phraseology in ab initio training efforts such as ground school and flight training instruction. Again, it is important to note that much of early flight training may be conducted by newly trained student CFIs with limited teaching experience. Without a structured and standardized aviation phraseology and communication protocol curriculum, student CFIs may become overwhelmed with other, perhaps more crucial, flight responsibilities and pay less attention to enforcing proper communication procedures. Creating strategies and structures which continue to encourage usage of standardized phraseology and communication protocols in advanced flight courses might reinforce proper pilot controller interaction and aid in student retention of aviation language communication policies and procedures.

Based on the results of this study, CAA flight programs do not currently share a global aviation philosophy. Only half of the CAA accredited flight programs surveyed reported teaching ICAO radiotelephony standards while 100% of the programs indicated teaching FAA

phraseology and communication standards. While these programs primarily operate in the continental United States, some programs reported participating in international flight activities. In the case of professional flight students, many graduates will operate in international airspace during the course of their careers. Large airports inside the U.S., such as Chicago, LAX, and JFK experience high volumes of international traffic, so professional pilots may encounter international pilots who are more familiar with ICAO phraseology and communication standards without ever leaving domestic airspace. Strategic routine surveys of flight program alumni which track statistics and gather qualitative data might help determine the need for a more global perspective in aviation phraseology and communications training. The structured methods might also assist in prioritizing the most common language and communication issues encountered in commercial flight. These standardized assessment tools could aid in directing future aviation phraseology and communication curriculum.

FURTHER RESEARCH

Recommended areas for future research include further study of how international academic and commercial flight training institutions address phraseology and communication instruction and curriculum. Studies could also explore if other international and domestic flight training organizations address language issues in their curriculum and if so, how these issues are qualitatively implemented. Are there programs which truly address first language issues for non-native speakers of English? If so, are the first language bias and cultural concerns of the students being targeted? Are we working with subject matter experts in interdisciplinary efforts to address these issues in the most effective manner?

There is much room for further study since this area of inquiry has only recently been broached. Most notably, new ICAO language and communication policies currently slated for implementation in 2008 may drive a need for more research in aviation phraseology and communication assessment, curriculum, and instruction. Philosophically, the aviation flight training industry must first decide that flight safety is dependent on clear communication and that aviation language proficiency is a top priority worthy of the precious and limited resources of time, personnel, and funding.

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APPENDIX

Table A-1. *CAA Accredited Flight Programs*

Arizona State University, Mesa, Arizona
Auburn University, Auburn, Alabama
Central Missouri State University, Warrensburg, Missouri
Daniel Webster College, Nashua, New Hampshire
Embry-Riddle Aeronautical University, Daytona Beach, Florida
Embry-Riddle Aeronautical University, Prescott, Arizona
Florida Institute of Technology, Melbourne, Florida
Louisiana Tech University, Ruston, Louisiana
Middle Tennessee State University, Murfreesboro, Tennessee
Parks College of Engineering and Aviation of Saint Louis University, St. Louis, Missouri
Purdue University, West Lafayette, Indiana
St. Cloud State University, St. Cloud, Minnesota
University of North Dakota, Grand Forks, North Dakota
University of Oklahoma, Norman, Oklahoma
Utah State University, Logan, Utah
Western Michigan University, Kalamazoo, Michigan

**Accredited programs as of July, 2005.*

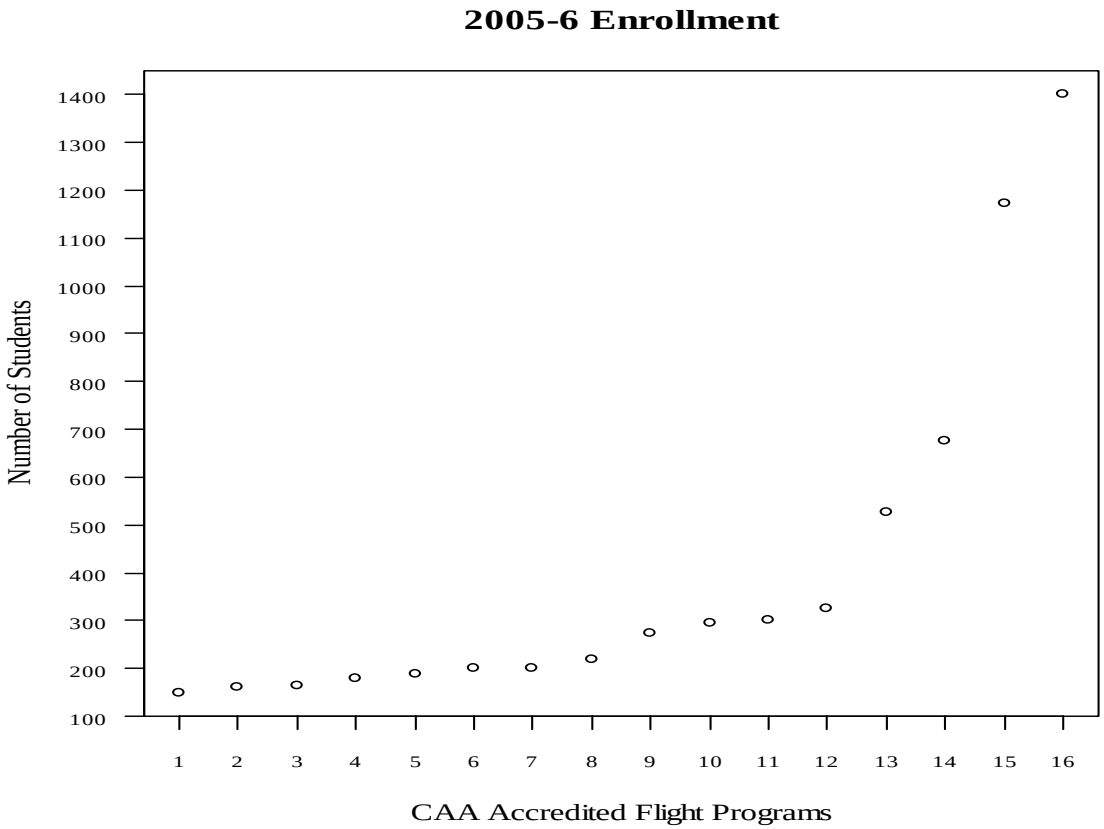

Figure A- 1. Flight Program Enrollment in Rank Order

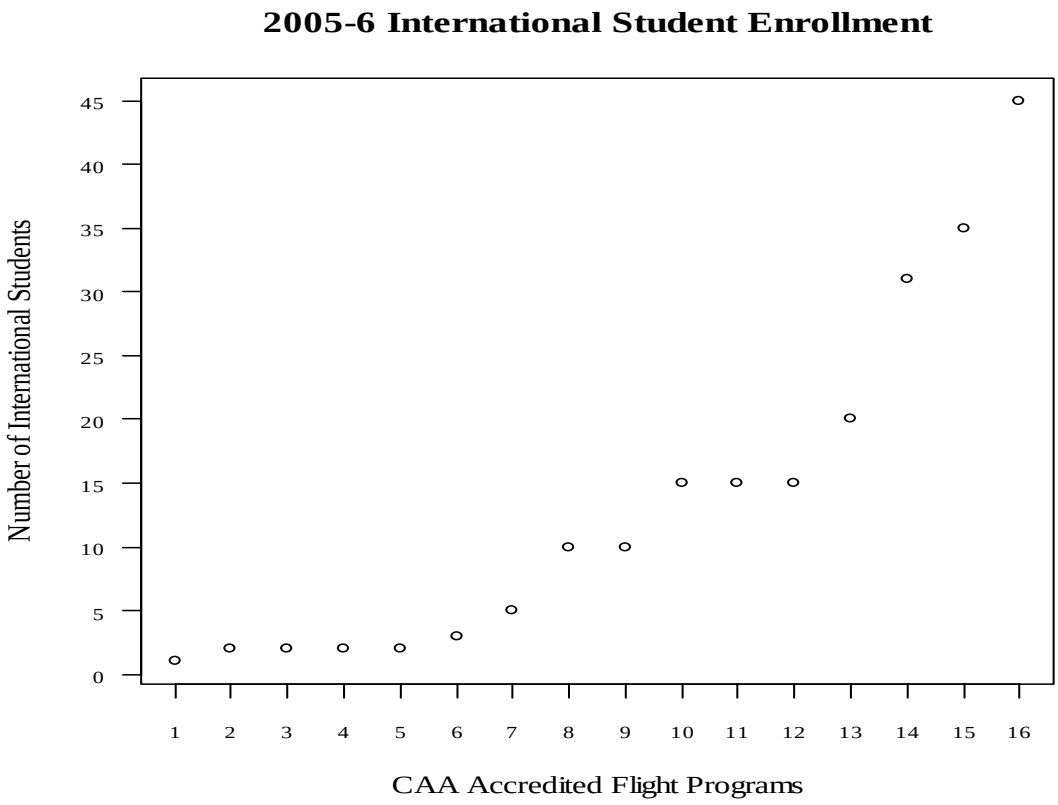

Figure A- 2. International Student Enrollment in Rank Order

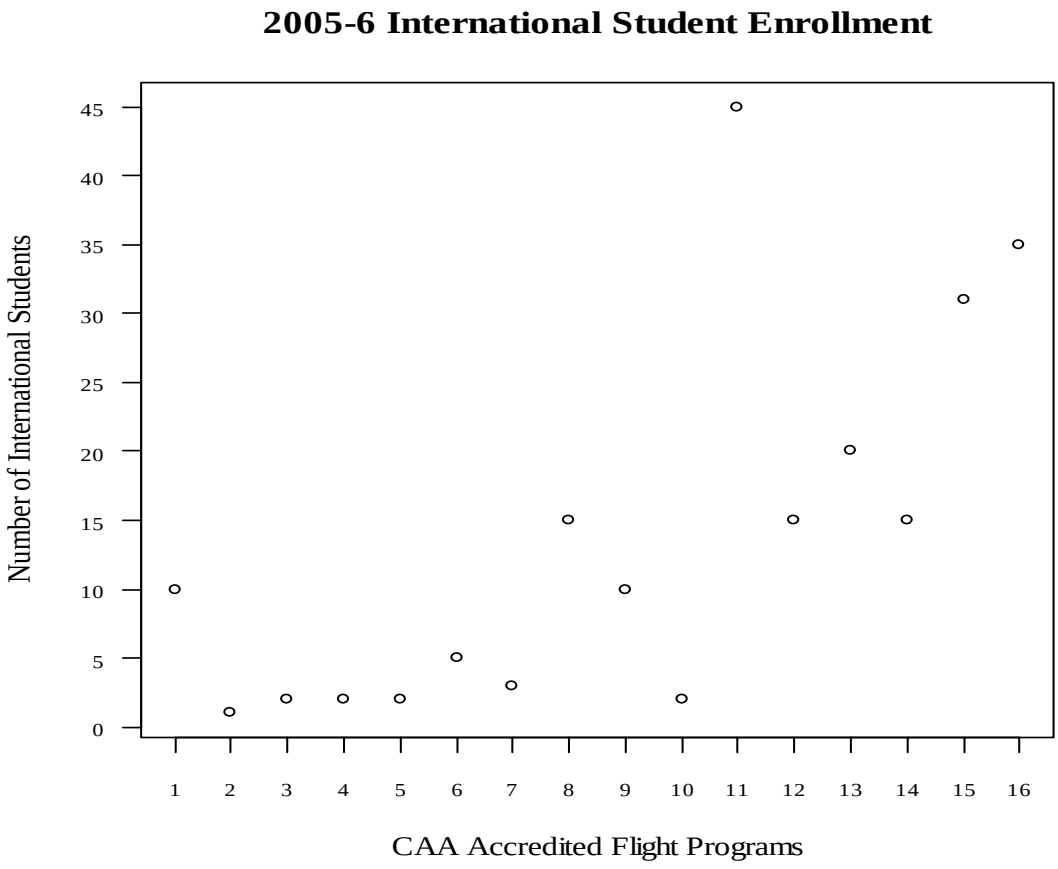

Figure A- 3. International Student Enrollment in Program Rank Order

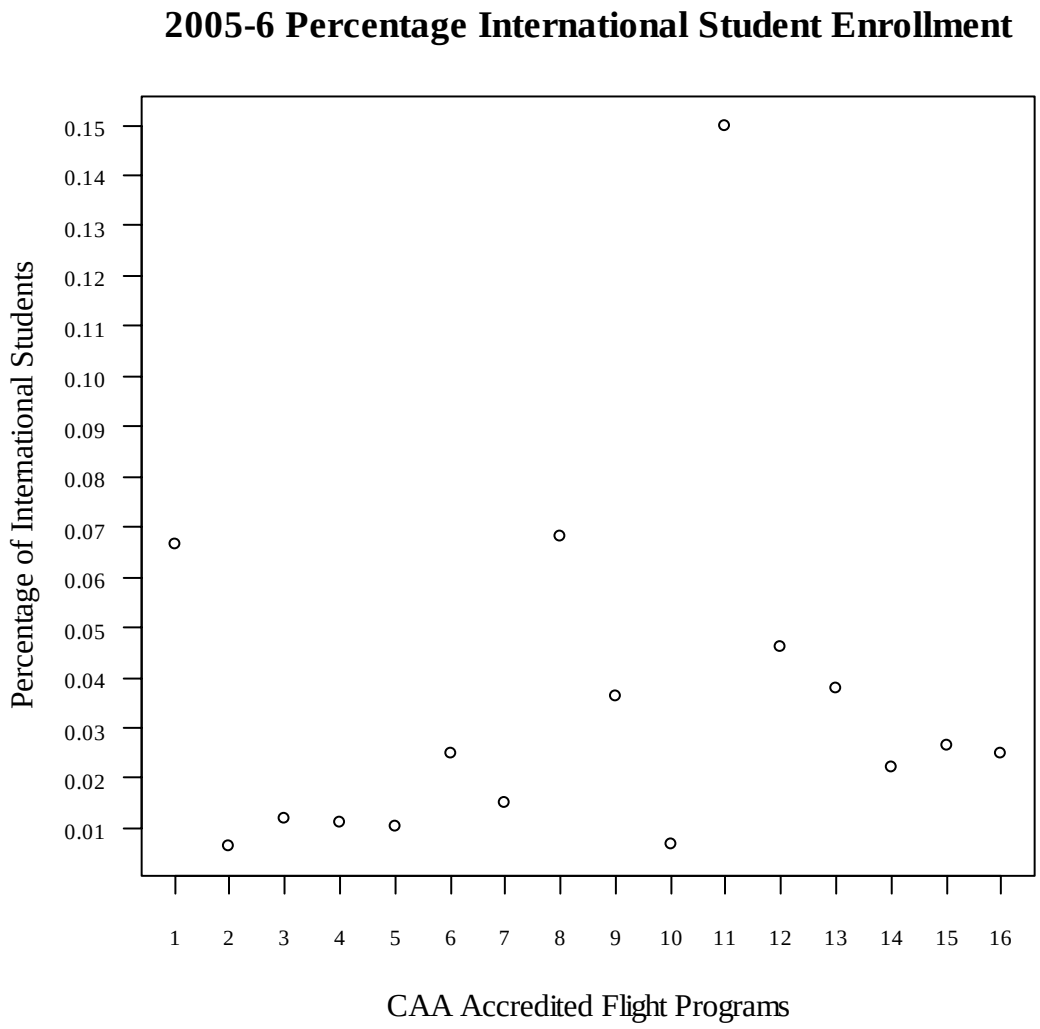

Figure A- 4. Percentage of International Students in Program Rank Order

Table A 2. *International Student Countries of Origin*

Country	Number of Programs	Response Rate
Argentina	2	12.50%
Australia	3	18.75%
Austria	2	12.5%
Bangladesh	1	6.25%
Belgium	1	6.25%
Bolivia	1	6.25%
Brazil	6	37.5%
Bulgaria	3	18.75%
Canada	6	37.5%
Chile	2	12.5%
China, People's Republic of	3	18.75%
Columbia	2	12.5%
Costa Rica	1	6.25%
Croatia	3	18.75%
Cyprus	1	6.25%
Czech Republic	2	12.5%
Denmark	2	12.5%
Dominican Republic	2	12.5%
Ecuador	2	12.5%
Egypt	3	18.75%
El Salvador	1	6.25%
Ethiopia	2	12.5%
Finland	2	12.5%
France	6	37.5%
Germany	6	37.5%
Ghana	1	6.25%
Greece	4	25.0%
Guatemala	2	12.5%
Honduras	2	12.5%
Hungary	2	12.5%
Iceland	2	12.5%
India	5	31.25%
Indonesia	2	12.5%
Iran	1	6.25%
Ireland	1	6.25%
Israel	1	6.25%
Italy	3	18.75%
Jamaica	5	31.25%
Japan	12	75.0%
Jordan	2	12.5%
Kenya	4	25.0%
Kuwait	3	18.75%
Lebanon	2	12.5%
Luxembourg	0	0.0%
Malaysia	2	12.5%
Mexico	4	25.0%
Mongolia	0	0.0%
Morocco	2	12.5%

Country	Number of Programs	Response Rate
Mozambique	0	0.0%
Nepal	1	6.25%
Netherlands	4	25.0%
New Zealand	1	6.25%
Nicaragua	1	6.25%
Nigeria	1	6.25%
Norway	3	18.75%
Pakistan	3	18.75%
Panama	2	12.5%
Peru	1	6.25%
Philippines	2	12.5%
Poland	2	12.5%
Portugal	2	12.5%
Romania	2	12.5%
Russia	2	12.5%
Saudi Arabia	5	31.25%
Singapore	1	6.25%
South Africa	3	18.75%
South Korea	4	25.0%
Spain	2	12.50%
Sri Lanka	3	18.75%
Sweden	3	18.75%
Switzerland	3	18.75%
Taiwan	5	31.25%
Thailand	2	12.5%
Trinidad and Tobago	4	25.0%
Turkey	3	18.75%
Ukraine	2	12.5%
United Arab Emirates	3	18.75%
United Kingdom	5	31.25%
Venezuela	3	18.75%
Vietnam	2	12.5%
Yugoslavia	0	0.0%
Zimbabwe	2	12.5%
other: Bahamas	1	6.25%
other: Liechtenstein	1	6.25%

The Face of Collegiate Aviation: Factors Impacting Self-Selection of Collegiate Aviation Programs

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ABSTRACT

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 attempted to determine if there is a difference in factors based upon gender and race that influenced 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 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. These findings will be especially helpful to collegiate aviation programs that actively recruit students to their institution.

INTRODUCTION

Recruiting and student selection is important to post-secondary institutions because there is a relationship between the number of students, course offerings, and tuition costs (Astin, 1975). Institutions use many methods to attract students to their respective colleges including written materials, campus presentations and electronic media (Hossler, 1999; Stonewater, 1999). Hurd (2000) stated that institutions that successfully attract learners to their campuses treat students as customers.

Prospective college students must make three decisions according to Astin (1977): a) whether to attend college, b) where to go, and c) how to go (p.1). These students must consider many factors when choosing an institution of higher learning (Astin, 1975; Manski & Wise, 1983; Tinto, 1987). The student's academic performance in high school, cost of tuition and level of parental education were factors in the institutional selection by students (Astin; Manski & Wise).

Luedtke (1993), in a study that sought to maximize participation in collegiate aviation, reported that with colleges and universities facing lower enrollment numbers due to the slow economy, institutions must seek to attract all students (Luedtke, 1993). While females enter postsecondary institutions at a greater rate than their male counterparts (Tinto, 1987), female students do not choose commercial aviation programs to the same degree (Luedtke, 1993; Moore, 1999). Similarly, minority students do not choose to enter commercial aviation programs at the same rate as Caucasian male students (Luedtke; Moore). For example, in the Fall 2002 semester, female enrollment at post-secondary aviation programs averaged 14 percent with minority enrollment less than 10 percent (Clark, 2002 & 2004). In contrast, women enrolled in post-secondary institutions in the Fall 1999 semester at a rate of 53.6 percent with minority enrollment of 30.6 percent (IPEDS, 2000).

BACKGROUND

The aviation industry has changed over the years; however the demographics of those who have chosen to enter the field have remained relatively unchanged in the last thirteen years

(Luedtke, 1993). The demand for and growth of air travel had risen steadily from the 1960s until the tragedy on September 11, 2001 (FAA, 2001). Prior to September 11, 2001, air travel was expected to continue growing even though 60% of the pilots flying domestic flights were expected to retire by 2015 (Mangan, 2000). While the aviation industry has continued to recover, women and minorities are still underrepresented in the field (Bowen, FAA, U.S. Department of Education, 1992; WIAI, 2001; Luedtke). For example in 2001 Female pilots made up less than three percent of the total pilots flying for airlines (WIAI). Similarly, minorities represent less than five percent with three percent of Hispanic origin and less than two percent black (U.S. Department of Education). Congress acknowledged that there are few women and minorities in the field; and was "interested in ways to increase the access of women and minorities to civilian aviation jobs" (U.S. Department of Education, 1992, p.1).

One of the implications of military downsizing has been that collegiate aviation has become a major source of training for pilots flying for commercial airlines (Karp, McCurry, Turney & Harms, 1999; U.S. Department of Education, 1992). Mangan (2001) reported that "six years ago, 80% of the nation's newly hired pilots had been trained by the armed forces; now just 50% of the new hires have military flying experience" (p.1). It was projected that by 2002, that only 10% of the newly hired pilots would be trained by the military (Mangan). Similarly, the National Academy of Sciences Committee recommended that aviation companies and institutions with aviation programs combine their efforts to seek and attract larger minority and female enrollment to aviation programs (U.S. Department of Education, 1992).

The end goal of post-secondary aviation programs is to provide trained aviators for the commercial aviation field (U.S. Department of Education, 1992). Additionally, recruiting to college programs can impact actual commercial aviation employee statistics (U.S. Department of Education). If four-year aviation programs can increase female and minority enrollment, an increase in females and minorities in commercial aviation should also occur (Brazziell & Brazziell, 1997; Hurd, 2000; Lipton, 2000; Moore, 1999; U.S. Department of Education). Therefore, it is important to determine why female and minority students choose to enroll in collegiate aviation programs (Luedtke, 1993).

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 attempted to determine if there is a difference in factors based upon gender and race that affected students' decisions to enroll in specific four-year post-secondary commercial aviation programs.

Research Questions

1. What factors influence students to enroll in collegiate aviation programs?
2. What institutional characteristics attract students to collegiate aviation programs?
3. Is there a difference in factors and institutional characteristics that attract male versus female students to collegiate aviation programs?
4. Is there a difference in factors and institutional characteristics that attract minority students versus non-minority students to collegiate aviation programs?

SIGNIFICANCE OF THE STUDY

Four-year collegiate aviation programs traditionally have low numbers of female and minority students. This study focused on student selection factors of collegiate aviation programs and analyzed those factors that were assumed to attract commercial aviation students. If the identified factors are proven to improve student selection and enrollment in institutions of higher learning with aviation programs, these factors may be implemented by institutions and programs in order to increase the number of female and minority students. Additionally, the outcome of this study may be used by institutions that are interested in developing four-year aviation programs that successfully attract a wide variety of students. For recruiting and retention efforts, it is important to determine why female and minority students do not enroll in collegiate aviation programs at the same rate of white males, and consequently, are not well represented in the field of aviation.

The survey instrument allowed the researcher to collect data from participants to

discover influencing factors in order to generalize them to the collegiate aviation population (Gall, Borg, & Gall, 1996). 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 selection. In addition, the study examined enrollment data by gender and race of students in 23 four-year post-secondary aviation programs.

SAMPLE

The sample for this study included students with declared commercial aviation majors enrolled in freshman aviation courses. In addition, all students in the sample attended a four-year post-secondary aviation program with paid membership in the National Intercollegiate Flight Association (NIFA). The National Intercollegiate Flight Association is an association of universities and colleges, both two-year and four-year institutions that develop, advance, promote, encourage and foster safety in aviation. To be eligible for membership, each school must be an accredited institution of higher learning with a regional educational accrediting association. The National Intercollegiate Flight Association had a membership of 60 post- secondary institutions at the time of this study.

Two-year institutions were eliminated from the study because a four-year degree is typically required to work for the commercial airlines. Additionally, students enrolled in two-year aviation programs usually transfer to a four-year institution to compete degree requirements in order to pursue careers in aviation. Thirty-eight four-year post-secondary aviation programs with paid membership in NIFA were identified in the United States at the time of this study. Two schools were eliminated because they no longer functioned as four-year post-secondary aviation programs. A third school was eliminated because its participation required monetary compensation to release enrollment data and administer the survey. Thirty schools agreed to participate in the study. Upon review of the respective institutional review boards two schools withdrew their commitment to participate because the researcher was not on faculty at their institutions. The target population included all commercial aviation majors enrolled in post-secondary commercial aviation programs in the United States.

INSTRUMENT

The instrument was developed in Fall 2003, from a literature review of factors that influenced student selection of four-year post-secondary institutions. Specifically, the factors found in the literature reviews were used to adapt the Ancrum-Smalls, Hagan, Kalbach, Smith-Wagner & Shepard (2000) survey instrument for use in four-year post-secondary institutions with commercial aviation programs. The survey instrument was divided into several sections to determine demographics, financial factors, program characteristics, and institutional characteristics of student selection.

All results are reported as aggregate data with the intention of not identifying a particular four-year post-secondary aviation program. Twenty-three of the 28 programs (82%) that agreed to participate in the study returned completed surveys (see Table 1).

Table 1. *Summary of Population, Sample, and Four-Year Post-Secondary Aviation Programs Returning Surveys*

	N	**P**
Population (NIFA, 4yr)	**38**	**100%**
Sample	**28**	**74%**
Returned Surveys	**23**	**82.1%**

The number of surveys mailed to each participating institutions was decided by the departmental chairperson from their respective institutions. Collectively, the chairpersons requested 983 surveys for the 23 four-year post-secondary institutions participating in the study. Seven hundred fifty-one surveys were returned for an overall subject return rate of 76% (see Table 2)

Table 2. *Summary of Subject Sample*

	N	**P**
Number of mailed surveys	**983**	**100%**
Number of returned surveys	**751**	**76.4%**

Summary data of gender, age, and racial category confirmed the literature review results with a high percentage of Caucasian males in four-year post-secondary aviation programs (see Table 3). Specifically, the modal respondent was male (85.5%), age 17-20 (65.2%), and Caucasian (79.9%). Female students represented thirteen percent of the respondents. Collectively, the minority racial category was sixteen percent. Specifically, African Americans or Blacks (5.6%), Asian or Pacific Islanders (4.3%), American Indian, Alaskan Native (1.5%), and Hispanic (4.7%) were included in the minority category.

Table 3. *Summary of Subjects Gender, Age, and Racial Category*

Variable		n	P
Gender			
	Female	98	13%
	Male	642	85.5%
	Total Reported	740	98.5%
	Missing	11	1.5%
	Grand Total	751	100%
Age			
	17-20	490	65.2%
	21-25	187	24.9%
	26-29	41	5.5%
	30-35	13	1.7%
	36-40	5	.7%
	Over 40	7	.9%
	Total Reported	743	98.9%
	Missing	8	1.1%
	Grand Total	751	100%
Racial Category			
	African American or Black	42	5.6%
	Asian or Pacific Islander	32	4.3%
	American Indian, Alaskan Native	11	1.5%
	Caucasian	600	79.9%
	Hispanic	35	4.7%
	Other	11	1.5%
	Total Reported	731	97.3%
	Missing	20	2.7%
	Grand Total	751	100%

RESULTS

Research Question 1 Research question 1 asked what factors influence students to enroll in collegiate aviation programs. The factors that influenced students to select four-year post-secondary commercial aviation programs are listed in rank order of very influential to not influential (see Table 5); this list included a variety of personal motivating factors, program factors, and institutional factors. The 10 most frequently selected as very influential, in descending order were, (1) always wanted to be a pilot (62%), (2) program educational quality (49%), (3) potential money in the field (37%), (4) university reputation (38%), (5) condition of equipment (34%), (6) institutional educational quality (32%), (7) availability of financial aid (31%), (8) availability of scholarships (30%), (9) interactions and perceptions of aviation community (30%), and (10) location of the institution (30%).

Research Question 2 Research question 2 asked what program and institutional characteristics attract students to collegiate aviation programs. The factors that influenced students to select four-year post-secondary commercial aviation programs are listed in rank order of very influential to not influential (see Table 5); The 10 most influential program and institutional characteristics that attract students to collegiate aviation in descending order were, (2) program educational quality (49%), (4) university reputation (38%), (5) condition of equipment (34%), (6) institutional educational equality (32%), (10) location of institution (30%), (12) small class size (26%), (13) safety concerns (26%), (14) program characteristics (24%), (15) student to faculty ratio (24%), and (16) distance from home (22%).

Research Question 3 Research question 3 asked if there is a difference in factors that attract male verses female students to enroll in four-year post-secondary aviation programs. There is little difference in factors that attract male verses female students to enroll in collegiate aviation programs (see Table 6). More than half (62%) of all participants rated the top survey item that influenced them to select a four-year post-secondary commercial aviation program, as very influential, and recorded "that they always wanted to fly" males (65%) and females (58%). Additionally, both male (50%) and female (49%) participants rated program educational quality as very influential. University reputation was ranked second behind program educational quality with male students (40%) and female students (36%). Institutional quality was very influential to a few more female students (40%) when compared to their male counterpart (32%).

Fifty chi-square analyses were computed for gender and the fifty factors using SPSS 11.0 (SPSS, 1999 & 2002). With 4 degrees of freedom and an alpha level of .05, and critical value of 9.49, two of the fifty survey items reported a gender difference. Female students reported that "the presence of Women in Aviation International (WIA)" and the "On-Campus Visit" significantly influenced their selection of a four-year post-secondary aviation program. The value of $x = 57.311$ $p > .05$ for WIA and $x = 14.488$ $p > .05$ for campus visit. The factors that influenced students to select four-year post-secondary commercial aviation programs are listed in rank order of very influential to not influential (see Table 5). In rank order of importance the on-campus visit was 24 out of 50. Similarly WIA was ranked 44 out of 50.

Research Question 4 Research question 4 asked if there is a difference in factors and institutional characteristics that attract minority students verses non-minority students to collegiate aviation programs. Each participant was asked to circle the racial composition that described them. The categories included African-American or black (6%), Asian or Pacific Islander (4%), American Indian or Alaskan Native (2%), Caucasian (80%), and Hispanic (5%).

Similarly there is diminutive difference in factors that attract minority and majority race students to enroll in four-year post secondary aviation programs (see Table 7). Collectively African-Americans or blacks, Asian or Pacific Islanders American Indians or Alaskan Natives and Hispanic (57%) rated the top survey items that influenced them to select four-year post-secondary commercial aviation program as very influential, and recorded that "they always

wanted to fly" similarly to the Caucasian (66%) participants. Program quality was the second most frequently selected by both African-Americans or blacks, Asian or Pacific Islanders American Indians or Alaskan Natives and Hispanic (52%) and Caucasian (50%) participants. University reputation was very influential for African-Americans or blacks, Asian or Pacific Islanders American Indians or Alaskan Natives and Hispanic (43%) and Caucasian (39%) when selecting a four-year post-secondary aviation programs. Institutional quality was nearly the same as university reputation for both minority (43%) and majority (32%) in influencing selection of a collegiate aviation program.

Fifty chi-square analyses were computed for racial category and the fifty factors using SPSS 11.0 (SPSS, 1999 & 2002). With 20 degrees of freedom and an alpha level of .05, and critical value of 31.41, seven of the 50 survey items reported a difference based upon racial composition. Specifically, African-Americans or blacks, Asian or Pacific Islanders American Indians or Alaskan Natives and Hispanic were statistically different with the value of $x= 37.62$ $p>.05$ for presence of WIA, the value of $x= 35.62$ $p>.05$ for institutional admission, value of $x= 50.931$ $p>.05$ for handicap/disability support , value of $x= 45.085$ $p>.05$ for gender of faculty ,value of $x= 57.822$ $p>.05$ for race of faculty ,value of $x= 33.835$ $p>.05$ for student gender , and the value of $x= 38.344$ $p>.05$ for student race when compared to their Caucasian counterpart. The factors that influenced students to select four-year post-secondary commercial aviation programs are listed in rank order of very influential to not influential (see Table 5). The rank order of the significantly higher factors for African-Americans or blacks, Asian or Pacific Islanders American Indians or Alaskan Natives and Hispanics varied and was (a) presence of WIA (44), (b) institutional admission criteria (29), (c) handicap/disability support (50), (d) gender of faculty (45), (e) race of faculty (49), (f) student gender (47) , and (g) student race (46).

Table 5. *Summary of Percentages for Factors Influencing Choice of Four-Year Post-Secondary Commercial Aviation Program in Rank Order of Very Influential (n=751)*

Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Always wanted to be a pilot	62.6	16.5	10.4	2.0	5.0
Program Educational Quality	49.0	31.7	31.7	2.1	2.9
Potential Money in the Field	37.3	33.4	14.8	5.6	6.1
University Reputation	38.1	35.6	14.5	5.6	3.7
Condition of Equipment	33.6	37.8	17.6	5.2	4.1
Institutional Educational Quality	32.1	37.0	19.3	4.9	3.6
Availability of Financial Aid	30.6	25.8	18.4	8.1	14.4
Availability of Scholarships	30.0	23.0	20.4	10.3	13.2
Interactions/Perceptions of Aviation Community	30.0	36.9	20.9	6.0	4.5
Location of Institution	29.6	28.2	20.5	9.3	8.9

Table 5 (continued).					
Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Tuition and Fees	26.9	28.1	19.3	9.3	13.8
Small Class Size	26.2	30.9	25.6	8.5	7.1
Safety Concerns	25.7	34.1	22.4	8.5	7.7
Program Characteristics	24.4	39.9	20.9	6.3	6.3
Student/Faculty Ratio	23.6	29.3	27	10.7	8.1
Distance from Home	22.0	24.4	19.8	12.5	18.5
Availability to Work while Attending Classes	21.7	23.0	21.6	13.0	18.0
Faculty Commitment	21.2	28.9	24.9	9.5	12.6
Number of Years Program has existed	19.3	27.2	26.2	13.4	10.9
Faculty Reputation	19.2	34.8	25.7	9.1	8.7
Availability of Internships	19.2	26.9	26.1	14.2	11.7
Campus Appearance	19.0	29.8	26.9	11.2	10.4
Program Philosophy	18.6	38.9	24.4	8.5	7.9
On-Campus Visit	18.1	26.8	23.6	11.9	16.6
Interactions/Perceptions of Faculty	17.6	34.4	25.6	9.9	9.3
Availability of Classes	16.8	35.4	28.0	11.7	6.7
Influence of a Family Member	16.4	20.1	20.0	16.2	24.0
Course Requirements	15.3	38.2	29.8	8.8	6.0
Admission Criteria	14.6	37.5	28.2	9.2	8.0
Length of Program (course work)	14.1	35.8	33.7	9.6	5.3
Familiarity of Campus	13.8	23.2	27.6	15.8	16.4
Campus Support Facilities (computer lab, library, etc.)	13.7	24.4	26.8	15.6	17.3
Core Requirements	13.4	41.3	30.0	7.7	5.5
Presence of Flight Team	13.3	18.5	24.5	18.8	23.6
Influence of a Friend	13.3	15.4	22.1	18.4	27.6
Interactions/Perceptions of Alumni	12.6	25.6	26.2	17.7	15.7
Interaction of Current Students	12.1	24.6	28.2	13.7	18.1
Faculty Mentorship	9.2	21.8	29.0	19.4	17.7

Table 5 (continued).					
Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Brochures/Pamphlets	9.2	21.3	28.8	20.2	17.2
Student Body Diversity	8.9	18.6	24.5	23.7	21.3
Faculty Research	8.0	20.1	28.4	19.3	21.3
Parking Availability	7.6	10.5	19.7	20.6	38.3
Presence of Similar Age Students	7.2	18.9	25.6	18.1	27.6
Presence of Women in Aviation International	6.0	9.6	16.4	18.6	48.5
Presence of Similar Gender Faculty	5.9	13.2	24.5	21.2	32.1
Presence of Similar Gender Students	5.6	11.5	20.5	20.9	38.7
Presence of Students with Similar Racial Composition	4.9	10.7	19.6	19.6	42.5
Presences of Alpha Eta Rho	4.8	8.9	19.2	19.6	45.8
Presence of Faculty with Similar Racial Composition	4.7	10.4	17.8	22.1	42.5
Handicap/Disability Support Services	4.0	7.6	11.2	15.0	59.1

Note. The values may not equal 100% due to missing data.

Table 6. *Summary of Percentages for Factors of Females Choice of Four-Year Post-Secondary Commercial Aviation Program in Rank Order of Very Influential (n=98)*

Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Always wanted to be a pilot	57.2	20.8	10.4	2.0	9.3
Program Educational Quality	48.9	34.6	10.2	3.0	3.0
Availability of Scholarships	37.5	20.8	16.6	7.2	17.2
Institutional Quality	37.5	37.5	13.5	4.1	7.2
University Reputation	36.4	39.5	12.5	4.1	7.2
Location of Institution	35.4	26.0	20.8	8.3	9.3
Tuition and Fees	34.3	20.8	14.5	10.4	19.7
Potential money in filed	33.6	4.0	14.7	42.1	7.3
Small Class Size	32.6	30.6	19.3	7.1	10.2
Availability of Financial Aid	30.5	24.2	13.6	8.4	23.1
Student/Faculty Ratio	29.5	26.5	19.3	12.2	12.2

Table 6 (continued).					
Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Program Characteristics	29.4	47.3	14.7	3.1	5.2
Interactions/Perceptions of Aviation Community	28.5	42.8	20.4	3.0	5.1
Conditions of Equipment	27.8	42.2	18.5	4.1	7.2
On-Campus Visit	27.3	32.6	10.5	10.5	18.9
Safety Concerns	26.5	38.7	14.2	10.2	10.2
Distance from Home	26.0	20.8	21.8	12.5	18.7
Availability to Work while Attending Classes	25.0	15.6	22.9	10.4	26.0
Faculty Reputation	24.2	32.6	17.8	11.5	13.6
Campus Appearance	23.9	28.1	21.8	13.5	12.5
Faculty Commitment	23.1	32.6	25.2	6.3	12.6
Influence of a Family Member	22.9	17.7	20.8	13.5	25.0
Interactions/Perceptions of Faculty	21.8	29.1	27.0	8.3	13.5
Admission Criteria	19.7	37.5	23.9	11.4	7.2
Number of Years Program has Existed	18.9	21.0	25.2	14.7	2.0
Program Philosophy	18.5	37.1	25.7	10.3	8.2
Length of Program	17.3	35.7	28.5	14.2	4.0
Presence of WIA	17.3	21.4	21.4	15.3	24.4
Familiarity of Campus	16.6	22.9	29.1	15.6	15.6
Campus Support Facilities (computer lab, library, etc.)	16.6	18.7	28.1	17.7	18.7
Presence of Flight Team	16.3	17.3	19.3	20.4	26.5
Availability of Classes	15.3	40.8	25.5	11.2	7.1
Interactions/Perceptions of Current Students	14.7	29.4	25.2	14.7	15.7
Course Requirements	14.4	42.2	25.7	10.3	7.2
Availability of Internships	14.2	30.9	25.7	13.4	15.4
Interactions/Perceptions of Alumni	13.4	26.8	21.6	17.5	20.6
Brochures/Pamphlets	12.5	23.9	26.0	17.7	19.7
Student Body Diversity	12.5	18.7	23.9	22.9	21.8
Faculty Mentorship	11.4	21.8	31.2	16.6	18.7

Table 6 (continued).					
Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Presence of Alpha Eta Rho	10.5	7.3	17.8	16.8	47.3
Influence of a Friend	10.4	8.3	23.9	22.9	34.3
Core Requirements	9.3	40.6	35.4	8.3	6.2
Faculty Research	7.3	17.8	25.2	24.2	25.2
Presence of Similar Gender Faculty	6.3	9.4	22.1	24.2	37.8
Presence of Similar Age Students	6.2	15.6	31.2	15.6	31.2
Handicap/Disability Support Services	4.2	5.3	15.9	12.7	61.7
Presence Similar Gender Students	4.1	6.2	27.0	19.7	42.7
Presence of Faculty with Similar Racial Composition	4.1	7.2	13.5	23.9	51.0
Presence of Students with Similar Racial Composition	4.1	7.2	16.6	18.7	53.1
Parking Availability	3.1	11.5	18.9	26.3	4.0

Note. The values may not equal 100% due to missing data.

Table 7. *Summary of Percentages for Factors of Minority's Choice of Four-Year Post-Secondary Commercial Aviation Program in Rank Order of Very Influential (n=120)*

Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Always wanted to be a pilot	57.2	20.5	16.2	0.0	9.4
Program Educational Quality	52.1	35.2	9.2	1.6	2.5
Institutional Quality	43.1	32.7	17.2	5.1	2.5
University Reputation	43.1	34.4	12.0	8.6	1.7
Availability of Scholarships	38.7	22.4	17.2	11..2	10.3
Potential Money in	38.4	33.3	16.2	7.6	4.2
The Field Tuition and Fees	36.2	25.0	14.6	10.3	11.2
Availability of Financial	35.0	27.3	19.6	8.5	9.4
Aid Condition of Equipment	34.1	44.1	15.0	5.8	2.5
Safety Concerns	33.6	37.8	19.3	5.8	3.3
Able to work while attending classes	32.7	15.5	24.1	14.6	12.9
Interactions/Perceptions of Aviation Community	31.0	41.1	19.3	4.2	4.2

Table 7 (continued).					
Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Small Class Size	29.0	25.6	19.6	11.1	5.1
Location of Institution	27.8	31.3	2.0	10.4	10.4
Distance from Home	26.4	20.5	23.9	11.9	17.0
Student/Faculty Ratio	25.8	34.1	23.3	11.6	5.0
Campus Support Facilities (computer lab, library, etc.)	23.9	29.0	24.7	11.9	10.2
Program Characteristics	23.5	33.9	11.7	4.5	2.6
On-Campus Visit	23.4	26.9	26.0	9.5	13.9
Presence of Flight Team	23.3	24.1	21.0	15.8	15.0
Faculty Commitment	23.2	37.0	23.3	9.4	6.8
Course Requirements	22.6	36.9	26.0	6.7	7.5
Number of Years Program has existed	22.4	29.3	25.8	11.2	11.2
Interactions/Perceptions of Faculty	22.4	22.4	37.9	11.2	4.3
Availability of Internships	20.1	27.7	31.9	12.6	7.5
Campus Appearance	19.8	37.9	28.4	12.0	1.7
Admission Criteria	19.6	45.2	18.8	7.6	8.5
Familiarity of Campus	18.4	29.8	22.8	17.5	11.4
Core Requirements	14.1	35.8	33.7	9.6	5.3
Student Body Diversity	18.1	31.0	25.8	9.4	15.5
Influence of a Family Member	17.9	19.6	25.6	10.2	26.4
Interactions/Perceptions of Alumni	17.7	25.4	23.7	19.4	13.5
Interactions/Perceptions of Current Student	17.2	27.5	25.8	15.5	13.7
Availability of Classes	16.0	40.8	25.8	10.8	5.8
Program Philosophy	15.1	36.4	20.7	7.8	5.0
Faculty Mentorship	14.5	25.6	27.3	13.6	9.4
Faculty Research	14.5	24.7	32.4	13.6	9.4
Length of Program	14.1	37.5	33.3	12.5	2.5
Presence of similar Gender Faculty	13.7	19.8	20.6	19.8	25.8
Influence of a Friend	12.8	23.0	26.4	14.5	23.0
Brochures/Pamphlets	12.3	33.6	27.4	15.9	10.6
Presence of Student s with Similar Gender	11.1	14.5	34.7	18.8	30.7
Presence of Faculty with similar racial comp.	10.3	18.9	18.1	20.6	31.8

Table 7 (continued).					
Survey Item	**Very Influential (%)**	**Influential (%)**	**Somewhat Influential (%)**	**Minimally Influential (%)**	**Not Influential (%)**
Presence of Students with Similar Age	9.4	25.6	24.7	16.2	23.9
Presence of Students with Similar Racial Composition	9.4	20.5	23.9	17.0	29.0
Handicap/Disability support services	8.5	13.6	19.6	19.6	38.4
Presence of WIA	8.3	2.0	18.3	10.8	42.5
Parking Availability	6.8	18.1	22.4	21.5	31.0
Presence of Alpha Eta Rho	5.9	15.2	21.1	16.9	40.6

Note. The values may not equal 100% due to missing data.

DISCUSSION OF THE RESULTS

Research question one asked what factors influenced students to enroll in collegiate aviation programs. The results suggested that aviation itself was a very influential factor that encouraged students who enrolled in four-year post-secondary aviation programs. Specifically, the most frequently selected very influential factor was that they always wanted to be a pilot. Consistent with the findings of Mangan (2001), American aviation students enroll in four-year aviation institutions to train for a career flying for major airlines. Handicap /disability support services was the most frequently selected factor marked not influential. Pilot training is physical and requires standards set forth by the FAA. Students not meeting those Federal standards are not likely to enroll in four-year post-secondary aviation program

Similarly, female and minority students selected that they always wanted to be a pilot most frequently as the factor that was very influential. Additional factors listed as very influential included: program educational, institutional educational quality, availability of scholarships, university reputation, tuition and fees, availability of financial and potential money in the field.

Female and minority responses vary for two of the ten most frequently selected factors for selection of a four-year post-secondary aviation program. Female students selected location of institution and small class size. On the contrary, minority students selected condition of equipment and safety concerns. Four-year post-secondary aviation programs can concentrate on these factors to attract more female and minority students to collegiate aviation.

In contrast, what was not expected in this study was the impact of the two write-in answers that were available to the participants. The two most frequently reported written-in answers that were marked as very influential were “The ROTC program” (15.1%) and “Faith or Mission based aviation programs” (14.9%). These findings were not substantiated in the review of literature. These two factors represented 25.0% of the written-in answers.

Research question two asked what program and institutional characteristics attract students to collegiate aviation programs. The ten most frequently selected program and institutional characteristics that attract students to collegiate aviation were program educational quality, university, condition of equipment institutional educational quality, location of institution, small class size, safety concerns, and 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 (Hurd, 2000). Consistent with Hamrick and Hossler (1996), this study found that despite many research studies on student selection no one conclusion can be drawn on institutional characteristics due to the variety of factors that influence student choice.

However, this study noted that the most frequently selected factors that attract students to four-year post-secondary aviation programs were similar across all gender and racial lines. Specifically, female and minority students selected program educational quality most frequently, as very influential. Additionally, female and minority students selected institutional quality, university, location of institution, small class size, student/faculty ratio, interaction/perceptions of aviation community, and the condition of equipment as very influential program and institutional factors.

Differences were noted among female and minority students on the program and institutional factors that were recorded as very influential. Specifically, in rank order, female students selected program characteristics 12 of 50 compared with 14 of 50 by the minority participants. Similarly, female students selected the on-campus visit 15 of 50, in rank order of very influential program and institutional factors, while minority students ranked it 24 out of 50. In contrast, minority students choose safety concerns 10 out of 50 in rank order of very influential while female students ranked it 22 out of 50. Finally, distance from home was ranked 15 out of 50 for minority students and 16 out of 50 for female participants.

Research questions three and four asked if there is a difference in factors that attract male and female or minority students to enroll in collegiate aviation programs. While the most frequently selected factors that attract aviation students are similar across gender and race lines, there are a few differences. The importance of Women in Aviation International (WIA) was statistically different for both female and minority students when compared with the overall group responses. These findings are consistent with Luedtke's (1993) study. Specifically, Luedtke found that female aviation students were interested in networking, joining professional organizations, participating in conferences, acquiring higher education degrees and as many flight ratings as possible, becoming more aggressive, seeking leadership from women, and being a role model for other women. Luedtke's results are all consistent with the mission of WIA. This study and Luedtke's confirm that the presence of WIA is influential to female collegiate aviation students. Similarly, the present study is consistent with Brazziel and Brazziel (1997) that student organizations and mentorship of students attract female and minority students.

CONCLUSIONS

This study found that 62.6% of the participants enrolled in their respective aviation program because they "wanted to be a pilot". Four-year post-secondary aviation programs should seek to attract students at the high school level with information regarding an aviation career. This suggestion reaffirms how vital The FAA's Aviation Education Program (ACE) is. Four-year post- secondary aviation programs should team up with the FAA, and their ACE program; that has been credited with guiding high school students to four-year post-secondary aviation programs (McGerald et al., 1993).

Additionally, this study confirmed the body of research concerning the under representation of female and minority students in four-year post-secondary aviation programs (Parish & Lea, 1991; Bowen, 1990). Similarly, the number of female and minority pilots at the airline level is minimal when compared with Caucasian males (NAS Report, 1998; FAA, 2000; WIAI, 2001). However, it should be noted that at the time of this study there was little research in the area of students in four-year post-secondary aviation programs

The identified factors may be used to improve student selection and enrollment in aviation programs at institutions of higher learning. These factors may be implemented across disciplines to increase the number of female and minority enrollment. Additionally, this study may be used by institutions that are interested in developing four-year aviation programs that successfully attract students.

There are several ways to expand this study to provide further information to collegiate aviation programs regarding the factors that

attract students. First, this study could be completed with successful students of four-year post-secondary aviation programs. The factors could be weighted to yield more definitive answers. Secondly, as a result of the successful student factors study, institutional recruiters could administer the survey to prospective aviation students to see if they are a good match for their aviation program.

More research is needed on the interaction between race and gender to examine why there are different factors that influence student selection of a collegiate aviation program. Further research is also needed to look at retention and completion rates by race and gender of students enrolled in four-year post-secondary aviation programs.

More research is needed to determine what socioeconomic factors impact selection of four-year post-secondary aviation programs. Further research to determine the type (private and public) of institutions with four-year post-secondary aviation programs would be beneficial. This could give insight concerning the student populations given the great cost of aviation training. Economic information combined with the identified factors may be used by four-year post-secondary institutions to improve student selection and enrollment in institutions of higher learning aviation programs. Additionally, these factors may be implemented across disciplines to increase female and minority enrollment. This study may be used by institutions that are interested in developing four-year aviation programs that successfully attract students.

Additional research is warranted on the effect of ROTC and faith-based institutions with selection of a four-year post-secondary aviation programs. This study noted 25% of the written-in survey items concerned ROTC and faith based institutions.

In summary, further research is needed to examine in greater detail the factors that influence selection and completion of four-year post-secondary aviation programs. This information at the collegiate level can be helpful in determining and training the students enrolled in four-year post-secondary aviation programs.

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Best Evidence for the FAA Industry Training Standards (FITS) Program for Pilot Training in Technically Advanced Aircraft[1]

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[1] The results of this study were presented in preliminary form at the National Aircraft Training Symposium in Daytona Beach, Florida, March, 2006, and the International Symposium on Aviation Psychology, Oklahoma City, Oklahoma, April, 2005.

ABSTRACT

To continue the investigation of the effectiveness of FITS syllabus training, which was previously evaluated in a 2004 study, the MTSU Aerospace Department FITS research team has conducted a second study. In the original study, a group of students were trained in a FITS-approved combined Private/Instrument curriculum in technically advanced aircraft (TAA). The effectiveness of that training was compared, through the identification of setbacks and bottlenecks in training, to archival records of students who had been trained in "round dial" aircraft using a traditional flight training curriculum. In the October 2005 issue of the *Collegiate Aviation Review*, we reported that the FITS trained students experienced statistically significant fewer setbacks and bottlenecks than the traditionally trained students. The question that remained was whether the FITS syllabus or use of TAA was the determining factor in the positive results experienced. In the phase of the study reported in this article, a new group of students completed their Instrument Rating training, this time flying TAA but using a traditional curriculum. The results of all three groups of students can now be compared, and the evidence suggests that it is the FITS syllabus that is responsible for the improvements in training, not the use of TAA. Further, the results of several surveys administered in this study indicate that not only is FITS training more efficient due to reduced bottlenecks and setbacks, but that it is also more effective at preparing students to make real-life decisions in the flight environment.

INTRODUCTION

Until very recently, issues with automated flight decks were only relevant to the commercial air carrier industry (Billings, 1997; Fanjoy & Young, 2005; Funk, Lyall, & Niemczyk, 1997; Parasuraman & Riley, 1997; Sarter & Woods, 1995). This is no longer the case, however, with the advent of automated cockpits that have recently proliferated in the General Aviation (GA) community (AOPA Air Safety Foundation, 2005; Casner, 2005; Young, Fanjoy, & Suckow, 2006). An automated aircraft is generally comprised of an integrated cockpit system consisting of a primary flight display, a multifunction display which includes a Global Positioning System (GPS) with traffic and terrain graphics, along with a fully integrated autopilot (AOPA Air Safety Foundation, 2005). In the GA community this type of aircraft, which requires the pilot to interface with at least one computer, is collectively known as a Technically Advanced Aircraft (TAA). It includes aircraft used in both VFR and IFR operations, with equipment certified to either VFR or IFR standards (AOPA Air Safety Foundation, 2005).

Not surprisingly, one key issue with the advent of this technology in GA aircraft is how to train pilots/students to take advantage of the increased safety opportunities that are available with the new technology (Fiduccia et al, 2003). In 1998, the FAA announced a "SAFER SKIES" initiative to achieve significant reductions in the number of GA fatal accidents by 2009. SAFER SKIES consists of two teams with similar goals to increase aviation safety. One of the teams, the General Aviation Joint Steering Committee (GAJSC) focuses on the leading causes of general aviation accidents. In order to assess what new safety challenges arise with the advent of the TAA, the GAJSC established a TAA safety study team to investigate safety issues with TAA aircraft. Part of the impetus for this was an observed increase in fatal accidents in TAA's (AOPA Air Safety Foundation, 2005; Fiduccia et al, 2003). This type of increase in the GA accident rate had also been observed in the mid-1990's, as aircraft that featured more technically advanced features became available

to pilots (Fiduccia et al, 2003). One of the major recommendations of the GAJSC was that the current training format in the GA industry was insufficient to exploit the additional safety features of TAA's, and that there was a critical need to develop a TAA training program in the GA community (Fiduccia et al, 2003). This approach was adopted by the FAA in a FAA Industry Training Standards (FITS) program (Federal Aviation Administration, 2004), which emphasized the importance of "real world" training exercises in the form of scenario training. This approach had proven successful in the air carrier industry, but is not the accepted standard the GA community. This training places a major emphasis on: aeronautical decision making skills, risk management, situational awareness, and single pilot resource management (SRM) using real-time flight scenarios (Ayers, 2006; Glista, 2003).

In 2004, the MTSU Aerospace Department received FAA Part 141 approval to train students for a combined Private Pilot Certificate and Instrument Rating using the FITS curriculum. This new curriculum was developed by the FITS consortium (University of North Dakota and Embry-Riddle Aeronautical University) and first empirically tested as part of a MTSU/NASA cooperative agreement study in 2004 and 2005. Over the last two years, the Aerospace Department FITS research team has published and presented the results of several studies regarding FITS training (Craig, Bertrand, Dornan, Gossett, & Thorsby, 2005a, 2005b; Dornan, Gossett, Craig, & Beckman, 2006). In the first study, we compared the flight training records of 19 students who had obtained both their Private Pilot Certificate and Instrument Rating using the traditional flight training syllabus commercially available through Jeppesen (2003) in a "round dial" aircraft, with students who received a combined Private Pilot Certificate and Instrument rating using the FITS syllabus in a TAA. In both groups, we discovered a pattern of "setbacks" throughout the flight training. A setback was defined as a lesson of training that a student had to repeat. A comparison of setbacks between the two groups revealed that students using the traditional syllabus in round dial aircraft had fewer setbacks in their initial flight training, but then had a steady increase in setbacks throughout the reminder of their training. In contrast, the FITS trained students in the TAA had a greater number of setbacks early in their training (pre-solo), but these setbacks diminished significantly as their training progressed (Craig et al., 2005a, 2005b). This data strongly suggests that FITS trained pilots have fewer setbacks over their entire VFR/IFR training than traditionally trained pilots (Craig et al., 2005a, 2005b). In this initial study, however, the FITS trained students utilized a TAA while the traditional syllabus students did all of their flight training in a "round dial" aircraft. It could therefore be argued that the overall decrease in setbacks enjoyed by the FITS trained students were partly or completely the result of the automation, e.g. the TAA and not the syllabus effected the change. In other words, it was possible that the FITS flight training syllabus had very little impact on decreasing the number of setbacks. Consequently, in this second study the researchers decided to empirically test for this possibility by comparing a group of students who had obtained their Instrument Rating in a TAA using the traditional Jeppesen syllabus with a group of FITS trained students in a TAA. If indeed it is the FITS training that makes the difference, then students who are traditionally trained in the TAA should experience the setbacks similar to those of the traditionally trained students in "round dial" aircraft. Conversely, if it is the utilization of the TAA that makes the difference, then the students trained using the traditional syllabus in the TAA should experience fewer setbacks as did the FITS trained students in the TAA. Therefore, in this study the primary goal was to empirically determine whether the FITS syllabus or the TAA was the driving force in the reduction of total setbacks. This was accomplished by comparing students who obtained the Instrument Rating in a TAA using the traditional syllabus, with students who obtained their Instrument Rating in a TAA using the FITS syllabus.

A secondary goal in this study was to compare the aeronautical decision making skills of FITS trained pilot versus traditionally trained pilots. For example, one major feature of the FITS training curriculum is that there is no minimum flight time needed to satisfy the

requirements of either their Private Pilot Certificate, or an Instrument Rating (Federal Aviation Administration, 2004); the training is completely proficiency based. In contrast, traditional Part 141 or Part 61 students must meet several minimum flight time requirements to be eligible for a Private Pilot Certificate and then an Instrument Rating. In the initial study, the FITS trained students had significantly fewer total hours when they completed their combined Private Certificate and Instrument Rating than did the traditionally trained group (Craig et al., 2005a, 2005b). In fact, one of the FITS trained students received her Private/Instrument with a total of 54.5 airplane hours! This actually troubled the FITS research team as poor pilot decision making skills and a propensity to take risks has been reported to be related to the experience level of a pilot (Klein, 1998; Stokes, Kemper, & March, 1992). In fact, flight experience has been reported to be positively correlated to effective decision making (Driskill, Weismuller, Quebe, & Hand, 1998). This is particularly problematic as poor pilot decision making skills has been identified as a major contributing factor in several fatal aviation accidents (Craig, 2000; Jensen, 1982), and in particular in several recent accidents involving TAA's (AOPA Air Safety Foundation, 2005). As a result, one major concern with the FITS combined Private/Instrument Rating is that since pilots will have significantly fewer flight hours (e.g. experience) compared to more traditionally trained students, what type of decision making skills will they have? One unique aspect of the FITS training syllabus is that while it still teaches basic flying skills (e.g. stick and rudder), these skills are not learned via "drill and practice" but rather through realistic flight scenarios. Experience in a variety of scenarios where critical decisions and risk assessment are continually evaluated give FITS students practice in making these decisions, and during the de-briefing, feedback on these decisions. This type of approach which is inherent in the FITS training syllabus is believed to improve decision making skills in pilots. Consequently, in this study several questionnaires evaluating risk assessment were administered to both groups following their flight training in an attempt to determine whether FITS trained pilots were more or less conservative in their aeronautical decision making skills.

METHODOLOGY

This study was comprised of forty-six students majoring in Aerospace at Middle Tennessee State University (MTSU). The students were divided into three groups, 1) "Traditional Syllabus Glass" consisted of eleven students who received their instrument flight training in a TAA using a traditional flight training syllabus. The traditional flight training syllabus adopted by MTSU and approved by the FAA is the Instrument portion of the Jeppesen Instrument and Commercial syllabus (2003). This publication is commercially available and widely used as an industry standard throughout civilian flight training programs in the United States, 2) "FITS Glass": This group consisted of the sixteen students from our earlier study that were trained using the FITS training program in a TAA and 3), "Traditional Syllabus Round Archival" which consisted of the training records of 19 students who received their instrument flight training in a round dial aircraft using the traditional syllabus with completed flight training records. These training records served as archival data and were used to compare setbacks and bottlenecks over the course of the Instrument training with the other groups. In addition, participants in the Traditional Syllabus Glass and the FITS Glass groups were administered several questionnaires regarding personal IFR visibility and cloud minimums which were standardized in a previous study (Dornan, Craig, & Gossett, 2006). Since the archival group consisted of past student training records, questionnaires could not be given to this group. Table 1 represents an overview of the study groups.

Table 1. *Study Groups*

GROUP NAME	AIRCRAFT	SYLLABUS	TIMEFRAME
Traditional Syllabus Glass N=11	TAA	Jeppesen IFR	Fall 2005
FITS Glass N=16	TAA	FITS Private/Inst	Fall 2004
Traditional Syllabus Round Archival N=19	Round Dials	Jeppesen IFR	1999-2004

RESULTS

As previously mentioned, in this study a training setback was operationally defined as a lesson of training that a student had to repeat that had previously been flown. In addition, a "bottleneck" was defined as a lesson or area of training that required the student to receive additional instruction beyond what is prescribed in the syllabus to reach the mastery of that lesson or area. In other words, if a one hour lesson was required and the student took more than two hours to complete the lesson, it was considered a "bottleneck".

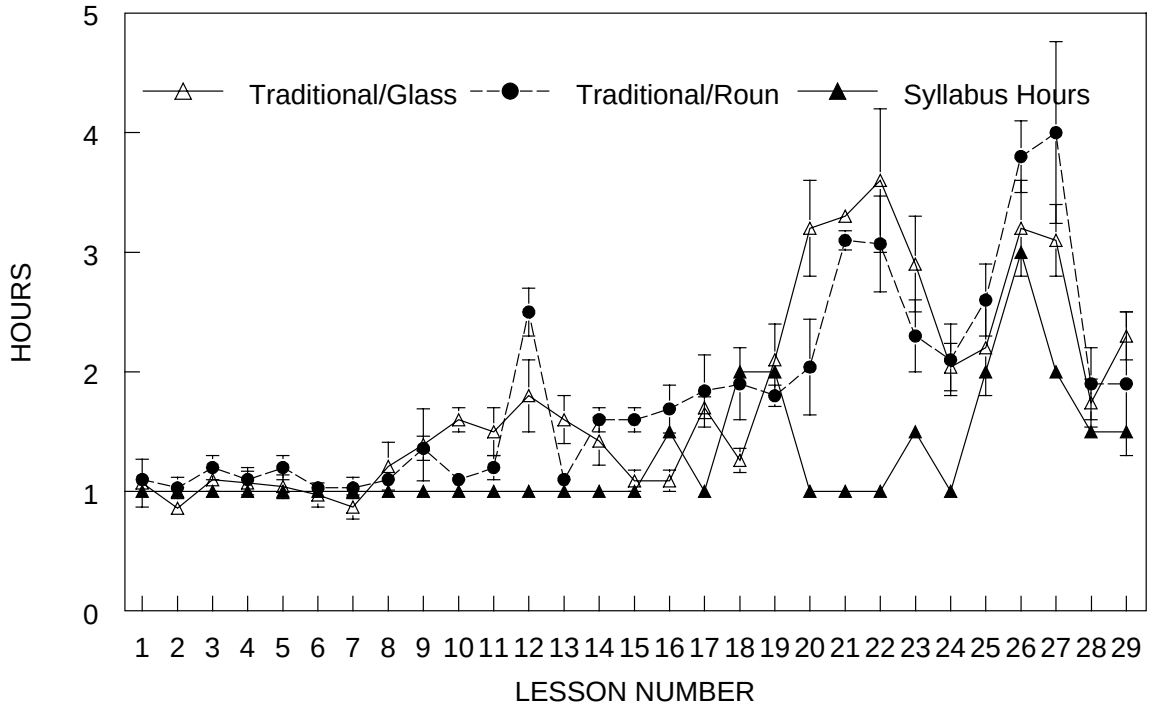

Figure 1. Illustration of the mean hours to complete each lesson in the Traditional Glass and Traditional Round Archival compared to what is prescribed in the Jeppesen training syllabus. Vertical bars equal ± standard error of the mean.

Figure 1 is an Illustration of the bottlenecks experienced by both the Traditional Syllabus Glass students and the Traditional Syllabus Round Archival students versus the "target time", or recommended number of flight hours that should allow mastery of the topics and maneuvers contained in the lesson. The target time comes from the Jeppesen Instrument syllabus. As you can see from Figure 1, in both groups seven bottlenecks are evident in the syllabus: Lesson 12, Lessons 20 through 24, and Lesson 27. Lesson 12 contains the skill of VOR tracking and radial intercepting as well as partial panel tracking. Lesson 20 and 21 contain the ILS instrument approach, including the partial panel ILS. Lesson 27 is an instrument cross-country review flight. Data from these seven bottlenecks were analyzed using a 2 x 7 ANOVA (Gravetter & Wallnau, 2004).

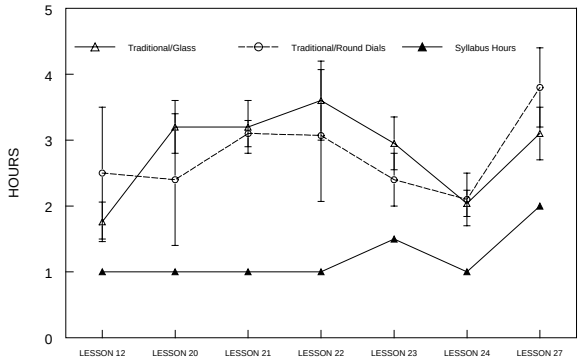

Figure 2. Illustration of the identified bottlenecks in the Traditional Glass and Traditional Round Archival compared to what is prescribed in the Jeppesen training syllabus. Vertical bars equal ± standard error of the mean.

As can been seen from Figure 2, an ANOVA comparing the effects of flight training and the number of lesson flight hours between the Traditional Syllabus Round Archival group and the Traditional Syllabus Glass group revealed no significant differences, $F(1, 223) = 0.17$, $p > 0.05$.

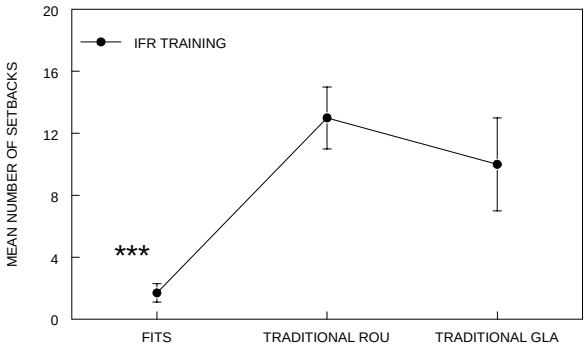

Figure 3. Illustration of the mean number of setbacks in the FITS, Traditional Glass (TRADITIONAL GLA) and Traditional Round Archival Group (TRADITIONAL ROU) compared to what is prescribed in the Jeppesen training syllabus. *** = significantly different from the traditional groups, $p < 0.01$. Vertical bars equal ± standard error of the mean.

Figure 3 illustrates the total number of setbacks during the IFR training experienced by each of the training groups. A one way ANOVA comparing total setbacks over the Instrument training for these groups revealed a significant main effect of training, $F(2,31) = 8.33$, $p < 0.01$. Post hoc analysis using the Scheffe's test revealed that the FITS Glass group had significantly fewer setbacks over their instrument training compared to both the Traditional Syllabus Round Archival and Traditional Syllabus Glass groups.

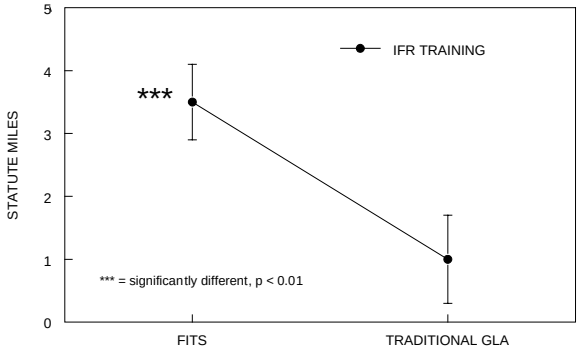

Figure 4. Illustration of the mean personal reports of visibility in the FITS group compared to the Traditional Glass trained group (TRADITIONAL GLA). Vertical bars equal ± standard error of the mean.

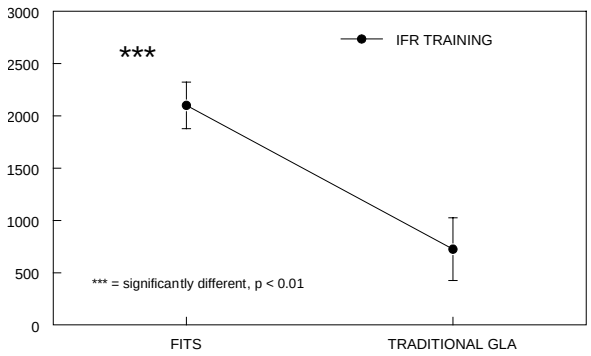

Figure 5. Illustration of the mean personal reports of ceiling in the FITS group compared to the Traditional Glass trained group (TRADITIONAL GLA). Vertical bars equal ± standard error of the mean.

Figures 4 and 5 illustrate the results of several questionnaires regarding personal IFR cloud and visibility minimums. As can be seen from these Figures, the FITS Glass trained group reported as personal minimums a mean visibility of 3.6 statute miles, and a mean cloud height of 2200 feet. In contrast, a mean visibility of 1.1 statutes miles and a cloud height of 700 feet was reported in the Traditional Syllabus Glass group. These personal minimums in the FITS Glass trained group were significantly greater; self-reported personal visibility, $t(28) = 4.65$, $p < 0.01$, and cloud minimums, $t(28) = 3.89$ $p < 0.01$ compared to the Traditional Syllabus Glass trained pilots.

DISCUSSION

In 2003, the FAA Industry Training Standards research group recommended that a new training approach emphasizing "realistic flight scenarios" would be a more effective training approach in TAA, and perhaps even eliminate the "gap" between available safety and actual safety of the TAA (Fiduccia et al., 2003). Our data examining the effects of a FITS training approach strongly support the recommendations of the FAA. Our data suggest that it is the type of training program and not the type of aircraft that is the driving force behind the benefits of the FITS syllabus. Pilots who trained using the FITS syllabus had significantly fewer setbacks over their Instrument training compared to traditional syllabus pilots trained in a TAA. In addition, FITS trained pilots were arguably more conservative in that their personal minimums were significantly higher compared to Traditional Syllabus Glass trained pilots. This is particularly noteworthy as both groups of pilots who were trained in a TAA, regardless of the training approach, reported feeling very comfortable with the automation in the aircraft, and also with shooting an IFR approach to minimums (data not shown). Regardless of their comfort level, the increased visibility and cloud minimums reported by the FITS trained pilots suggest that although the FITS students are comfortable with the automation, they would be less likely to "launch" when visibility and clouds are low. In contrast, the significantly lower visibility and clouds minimums reported in the Traditional Syllabus Glass trained pilots (e.g. mean cloud height = 700 feet), strongly suggests that traditional training approaches in a TAA may be inadequate.

In 2004, after the first group of students had completed the FITS combination Private and Instrument syllabus, the researchers had data that indicated that training improvements had been accomplished. Students in the FITS syllabus had fewer setbacks in their training. A setback is not simply a statistic to be compared inside a research study. A flight training setback also represents an increase in the total cost of flight training and an increase in time it takes to complete the training. A single setback can cost a student approximately $150 extra in training costs. In 2005, when the researchers compared the number of setbacks that students encountered within the FITS syllabus, versus the traditional syllabus which had been used for years, we saw that on average, students in the FITS syllabus had ten fewer setbacks across their Private and Instrument training. That represented a savings of approximately 9 percent per student. Setbacks also have an emotional cost. Students can often get discouraged, and even drop out of flight training all together when they are faced with multiple setbacks and extra costs. The FITS syllabus, with its inherent real-world applications, fewer setbacks, less frustrations, and lower cost, was reported by students as being hard work, but it was very enjoyable to the students.

In 2005, the researchers began the second phase of the project. This time students would

train using TAA, but using the traditional syllabus. The researchers believed at the on-set of this phase, that one of two possibilities would emerge. If improvements enjoyed by the FITS Group were also enjoyed by the Traditional Syllabus Glass Group, then the researchers could conclude that the technology of the "glass cockpit" had generated the improvements. On the other hand, if the setbacks that the Traditional Syllabus Round Dial Archival pilots suffered reappeared in the Traditional Syllabus Glass students, then the researchers could conclude that it was not the technology, but the FITS training method that created the improvements. As this paper has presented, the data collected indicates now that technology alone does not produce training benefits. The data indicates that the FITS approach, with its involvement of higher-level thinking skills, is the difference maker.

After this conclusion was drawn, the researchers wanted to determine just what type of pilot is being produced by FITS. Reducing setbacks in training and saving money are both excellent goals, but what really matters is that these pilots make better decisions than their predecessors and as a result are safer pilots. Our data suggest that this is the case. Whether conservative minimums translate into safer pilots, and whether or not these pilots remain that way over the long term, are two critical questions that will be addressed in future research at MTSU. The researchers used a series of surveys to determine the level of caution versus risk-taking that was present in the various pilot groups that were studied. The evidence indicates that when each flight lesson incorporates a decision process that involves the assessment of risk in real-world settings, that pilots will be more cautious once they are in the real-world. The FITS trained pilots were more comfortable in the IFR environment, but nevertheless more cautious than the non-FITS pilots.

CONCLUSION

Pilots that have been trained using the problem-solving, scenario-based approach that is the cornerstone of FITS, have been the beneficiary of various flight training improvements. They also have emerged from the FITS training better prepared to deal with real-world pressures because they were trained to do so. The introduction of TAA into the civilian General Aviation flight training environment can become either a blessing or a curse. The evidence from our study indicates that TAA and FITS are a good match. TAA takes aircraft to a higher level; FITS takes flight training to a higher level. The TAA offers capabilities that could easily exceed the pilot's risk-assessment capabilities. A TAA in the hands of a pilot who has not been taught to make real-world decisions properly and who consequently becomes a risk-taker is a formula for disaster. TAA and FITS are coming of age simultaneously; our research indicates that the FITS concept of flight training can reduce setbacks, save money, and minimize training time and that the transition to the TAA can best be accomplished safely with FITS.

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The Experience Factor: A Regional Airline View of Pilot Candidate Qualifications

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ABSTRACT

Pilot hiring by the regional airlines has finally begun to rebound from the downturn that followed the events of September 11, 2001. While major airlines have traditionally hired aviators with high-time military flight experience, greater numbers are now being selected from the general aviation population. Regional airlines, in particular, depend on recruitment of less experienced aviators to sustain their rapidly expanding sector of commercial aviation. This study sought to determine the experience factors that regional airline managers consider important to the selection process for new hire pilots. Key administrators at eleven regional airlines were surveyed to identify their current hiring criteria and perceptions of applicant quality. Findings from this study provide useful insights for flight training program development as well as individual applicant preparation.

INTRODUCTION

Airline hiring practices have been cyclical in nature over the last several decades, generally following economic trends. When the national economy is healthy, hiring occurs at all levels – general aviation, corporate aviation, regional airlines, and major airlines (BTS, 2006). During these times, highly experienced flight crewmembers are sought by all sectors of the industry. While there are some common hiring criteria, e.g. flight time and FAA certification, each company determines its own composite hiring scheme. The purpose of this paper is to highlight experience considerations above and beyond flight time and certification level, which are viewed as critical attributes for prospective airline pilots. While operators want to hire the most experienced aviators, high flight time and number of FAA ratings are only part of the equation. What weight is accorded various experience factors by industry employers? What is the basis for these determinations? A survey of prospective airline employers may provide insight to these questions and be especially helpful for flight training program administrators who wish to find employment for their relatively low flight time graduates.

LITERATURE REVIEW

A significant body of research has been completed to predict the success of military aviators (Hunter & Burke, 1994; Martinussen, 1996; Ree & Carretta, 1996; Turnbull, 1992). In the early years of military aviation, cognitive ability testing was considered the primary selection factor. The requirements of combat flying in World War II led to additional predictive assessments of pilot candidates to include intelligence, psychomotor, spatial, and mechanical testing (Flanagan, 1946; Griffin & Koonce, 1996; Klein, 1948). Since that time, there has been continuing interest in predictive measurements of prospective flight crewmembers. More recent testing batteries have included psychological and behavioral measurement, personality assessment, and stress tolerance evaluation (Ree & Carretta, 1996; Turnbull, 1992). The airlines have traditionally recruited former military pilots, and current hiring practices in commercial aviation have certainly been influenced by predictive measurements that were developed for the military.

Hunter and Burke (1994) conducted a meta-analysis of aircraft pilot-selection measures from 68 military studies completed from 1940 to 1990. Their analysis suggested significant predictive power in measures such as quantitative ability, spatial ability, mechanical ability, aviation information, general information, gross dexterity, perceptual speed, reaction time, biographical inventory data, and job performance. However, they noted a decline in predictor validity within the studies since 1961 due to the smaller sample sizes associated with those studies. Martinussen (1996) analyzed 50 studies that examined pilot performance predictors. Her meta-analysis of the data included studies from 11 different countries,

conducted from 1919 to 1993. While consistent information was often difficult to obtain, Martinussen divided the predictors into nine categories: cognitive tests, intelligence tests, psychomotor/information processing tests, aviation information tests, personality tests, biographical inventories, combined index, academics, and training experience. Correlations derived during this study suggest that pilot selection batteries should focus on measurements of cognitive, psychomotor/information processing, and motivational factors to identify successful candidates. Martinussen also recommends that previous training experience should be included in any predictive formula; while less emphasis should be placed on general intelligence tests, academics, biographical inventories, and personality tests.

Researchers have identified a wide variety of additional predictive factors for success as an aviator. Jensen (1995) states that good judgment is critical to pilot success, especially when developed through meaningful experiences rather than accrued flight time. Although he views good judgment as a subjective quality, valid tools have been developed to measure this trait, even before training occurs. Crew resource management (CRM) skills have also been included as a necessary quality for working in a team environment (Hedge, Bruskiewicz, Borman, Hanson, & Logan, 2000; Helmreich, Wiener, & Kanki, 1993). New strategies have been developed to validate predictors of effective crew performance, allowing for discrimination among individuals. These measurements take into account motivation and interpersonal skills that enhance group processes. As less experienced pilots are hired into today's transport aircraft, Hedge, et al. (2000) predict future selection boards will rely more on aptitude tests, especially in the area of effective crew coordination. Frey, Thomas, Walton, and Wheeler (2001) assert that situational awareness, or a person's mental model of the surrounding world, is essential to safe and expert pilot performance. Their research focused on a commercially available test to measure situational awareness and stress. While they found some validity in measurements of situational awareness during a simulated flight, they identified a need for better alignment of selection, training, and performance measures.

Damos (1996) has been studying pilot selection systems for several years. The results of her investigations suggest that a majority of pilot selection tests predict training performance rather than operational performance. The complexity and magnitude of pilot tasks (from preflight to postflight) make operational performance difficult to identify and measure, whereas performance during training is measured continuously, throughout the training program. In her more recent studies, Damos (2003) found that structured pilot selection systems are more effective than casual pilot selection systems for the identification of successful pilots. Casual selection systems typically rely on an individual judgment of an applicant's potential, often based on an informal interview and review of the applicant's paperwork. Reference to a company's hiring standards and mission may not occur during such an unstructured approach. Structured pilot selection systems, on the other hand, include consistent written and/or computer-based evaluations of candidate knowledge, skills, and abilities that are required to assess pilot competency and forecast success. These evaluations may also address personality, information processing, intelligence, and airplane/simulator performance. Damos (2003) has proposed strategies for designing effective pilot selection systems with improved predictive validity to support company requirements.

Flight experience levels of major airline new hires have increased over the last few years, yet these levels have actually decreased for their regional airline counterparts (Tippens, 2005). Most major airlines require a minimum of 1,500 hours of pilot-in-command turbine time for employment consideration, but candidates typically have several times that amount. Many regional air carriers, on the other hand, have lowered their minimum flight experience requirements to well below 1,000 hours. Some universities and colleges have developed bridge programs with regional airlines. In these programs, coursework and flight training is tailored to the partner airline's procedures and graduates become eligible for employment with

only a few hundred hours (Karp, 2004). Tippens (2005) asserts that regional airline employers, to accurately assess the reduced experience levels of currently available pilot candidates, have significantly modified elements of their hiring process to provide heightened scrutiny and increased predictive validity. The current study was designed to identify experience factors considered important by regional airline employers and to determine how employers view this younger, less experienced candidate pool.

METHODOLOGY

A phone survey was developed to assess regional airline attitudes regarding experience levels of new pilot candidates. The survey was used to collect information on the pilot hiring process, types of evaluation instruments used, relative value assigned to attributes and traits, changes in the employer's evaluation method over time, and biographical data associated with the person interviewed. The survey was administered to a sample of regional airline upper level managers. The targeted population included all U.S. regional airlines that provide scheduled domestic passenger and cargo service with an aircraft fleet that is principally limited to fewer than 70 seats. Nineteen airlines in this category were identified, along with contact information of either the Chief Pilot or Director of Operations, from the current edition of the World Aviation Directory (2005). Respondents were advised of the purpose of the study, received assurances of confidentiality, and were then given the survey questions. The authors were able to obtain survey information from company officials at 11 of 19 airlines for a 58 % response rate.

FINDINGS

Although the operational experience of survey respondents may add some level of bias to the data, the authors believe the responses provide a reasonable representation of current regional airline hiring practices. An analysis of the biographical data collected from the respondents suggests many commonalities among regional airline equipment, employment practices, and management structures. Equipment operated by the eleven respondents totaled 925 aircraft with the majority being regional jet variants. Some operators also use older Embraer 120, Saab 340, and DHC-8 aircraft. The average number of aircraft operated by regional airlines in the survey population was 84 and the range varied widely from 20 to 200 aircraft per airline. To support this inventory, most responders reported a current hiring rate of 100 - 200 new pilots per year.

The first few questions on the survey addressed minimum experience requirements stipulated by employers. Detailed information about these requirements can also be found on most company websites, website chat rooms, and other aviation media sources. Six of the eleven respondents stated a minimum flight time requirement of 1,000 hours and the remainder set 1,500 hours as the minimum. The multi-engine experience requirement for most respondents ranged from 100 to 500 hours, with two respondents indicating that they did not have a multi-engine minimum. All of the respondents required a commercial certificate with an instrument rating and two required successful completion of the Air Transport Pilot written examination for employment. Although most employers prefer applicants with a four year college degree, that level of education was not required. When asked what additional value they place on graduate education, most said "none". Three respondents, however, felt graduate work demonstrated an important commitment towards improving a candidate's career potential. Finally, respondents were asked about the percentage of hiring decisions based on factors beyond the minimum requirements and their responses varied from 20 to 85 percent. It is unclear whether these responses reflect higher values in the established minimum categories, such as flight time, or whether the respondents were reporting consideration of additional categories such as personal attitudes or CRM.

Most airline employers have a structured candidate evaluation process that includes a variety of instruments to assess skill levels and compatibility with company operating style. When asked what types of tests they used during the pilot selection process, eight respondents identified airman knowledge tests with questions

drawn from the ATP written test guide book and six included a flight simulator evaluation. When asked what consideration testing received in the hiring process, most respondents indicated a relatively strong influence (4 on a 5-point Likert scale). Interestingly, almost half of the respondents did not have strong confidence in the ability of current test instruments to predict successful candidates, even though testing received higher weight than most other predictors. When asked why they did not make better use of predictive instruments, responses included: do not trust, do not need, and poor cost/benefit tradeoff. Two respondents noted that the CRM aspect of their simulator evaluations provided sufficient insight that would otherwise be obtained with psychological profile testing.

Respondents were asked what additional skills, traits, and attributes were important to applicant consideration. Responses to this question did not suggest a common theme, but rather a broad spectrum of considerations that may reflect individual company values and direction. Identified attributes included: first impression of attitude, type of flying environment experience, past equipment flown, communication skills, career goals, and potential for success. Following this question, respondents were asked to rank the importance of a wide variety of candidate traits on a Likert scale from 1 (low) to 5 (high). Average values were calculated from survey responses. High importance was associated with candidates who were team players (4.7), trainable (4.6), had good CRM skills (4.5), and current flight experience (4.2) (see Figure 1). Low importance was associated with completion of an A&P certificate program (2.8), military experience (2.5), and age of candidate (1.8) (see Figure 2). Respondents found other assessed traits to have moderate importance, including: college education (3.9), prior Part 121/135 experience (3.9), turbine engine experience (3.7), total time (3.2), glass cockpit experience (3.2), and advanced simulator experience (3.1) (see Figure 3).

Supply and demand for the current pilot pool was the last area addressed on the survey. With a continuing decline in the availability of military pilots, employers must look to a civilian

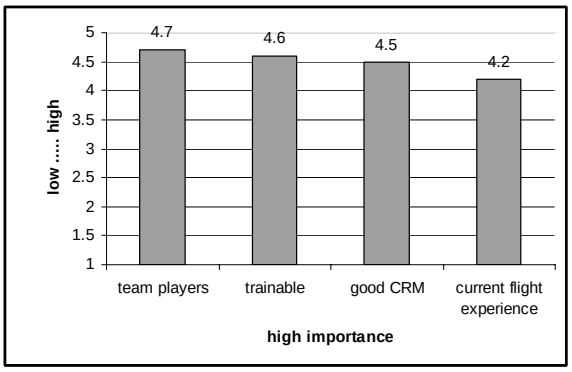

Figure 1. High importance of candidate traits

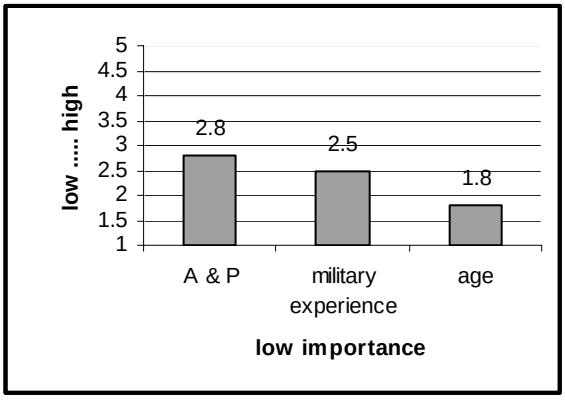

Figure 2. Low importance of candidate traits

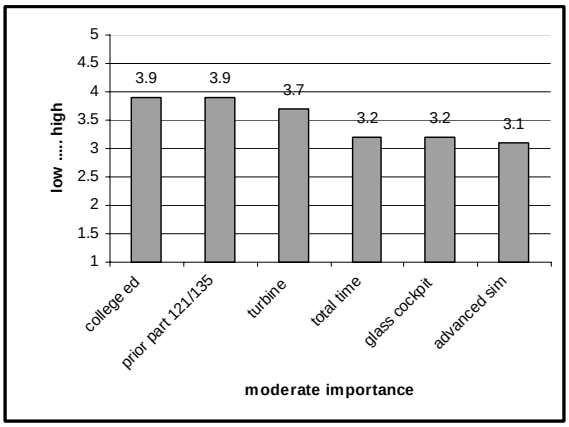

Figure 3. Moderate importance of candidate traits

pilot pool with much less flight experience. Half the respondents said that they lower their minimum flight experience requirements in response to the demand and availability of more experienced pilot candidates. During a pilot shortfall, employers have to fill pilot seats to maintain company profitability, and may need to work with a larger pool of lesser experienced

pilots. The remaining survey respondents said they do not change minimums, but merely cast a wider net and expand the number of "looks" at each candidate. All respondents said that when experience levels drop in the available pilot pool, they expect training failure rates to go up and higher numbers of new hires to not complete probation. On the other hand, when fewer pilots are needed due to market pressures or company downsizing, employers have the luxury of raising the experience bar to take advantage of the most highly qualified candidates. This situation benefits the regional employers who then acquire more experienced pilots with attributes they desire, including professional competency and an attitude that fits the corporate culture. When asked to rate the quality of the 2006 pilot pool, respondents reported an average of 3.5 on a 5 point scale of low to high. Respondents said they will closely examine this group to identify the candidates most likely to be successful. Their primary determinants of this potential, in no particular order, are good attitude, confidence, good knowledge levels, teamwork, interest in their particular airline, an ability to advance on time, and personal values similar to those of the company.

CONCLUSION

It appears that regional airline hiring has rebounded from post 9/11 levels, which left many new pilots scrambling for employment opportunities (BTS, 2006). With the increasing demand for additional pilots, however, comes a great concern from employers that seats may be filled by lesser experienced pilots. For regional airline employers in particular, the dilemma is to reduce inventory and cockpit seats or hire relatively inexperienced crewmembers based on some evaluation formula with questionable predictive validity. A rich body of literature details past research into various predictors of pilot success. Particular support has been indicated for judgment, situational awareness, and CRM as effective predictors of pilot success when evaluated in concert with flight time and aviation knowledge. The results of the current study suggest that regional airline employers highly value team players, trainable personalities, and a company-friendly attitude, along with flight experience. However, respondents to the current survey still depend on selection systems that focus on flight time as a determinant of technical competence and interviews that enable the interviewer to develop impressions regarding candidate attitude. Although structured evaluation models that employ a variety of evaluation instruments have been found to have great value in predicting pilot success, many survey respondents said they have little confidence in predictive measures that are based on qualitative attributes. In addition, findings from the current survey do not suggest support for age, military flight duty, or completion of additional technical training (such as an A&P certificate) as predictors of success. More research is indicated to enhance predictive models for particular airline employers and the results of such work must reflect sufficiently high validity levels as to engender unreserved employer confidence.

The findings of this study also provide useful information for the aviation training community. Flight training operations, which have traditionally focused on stick and rudder skills and tests of entry-level knowledge, must broaden their curricula to include learning skills as well as practical instruction in interpersonal and decision-making skills. Such aspects of training must be present throughout the program and not limited to a capstone or charm school course that is presented towards the end of training. Renewed emphasis must also be placed on the use of advanced decision-making skills in a realistic operational context. Based on the findings of this study, regional airline employers select candidates that they believe will be easily trainable, able to professionally interact with other crewmembers and customers, and best reflect company values and principles. These employers expect pilot candidates who are able to do much more than just complete assigned flight tasks within numerical parameters. They expect polished professionals who are current in their flying experience and possess excellent crew resource management skills, allowing them to interact well with others in and out of the cockpit. And that means employers' expectation of experience is much more than FAA certificates and logged flight time.

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Safety Performance Comparisons in Scheduled U.S. Carrier Operations: 2000-2004

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ABSTRACT

Airline safety is an important factor that customers seek and expect from air carriers. Safety performance, related to the rate of accidents and incidents, is frequently associated with the effectiveness of a carrier's internal processes. On-time performance, lost luggage, and customer complaints are, among others, publicly reported performance indicators that may differentiate one carrier from another. This article will consider how safety as a key performance indicator may reflect the effectiveness of the organization's operational policies and processes. The paper proposes that low-cost carriers (LCCs) demonstrate a better safety performance record than mainline and regional carriers. The results of this exploratory study of five years of safety and on-time performance data involving carriers in the United States suggest that the low-cost carrier segment is less prone to accidents and incidents and offers the best performance. As a result, the low-cost business model may improve an airline's safety and operational performance since it more efficiently transforms organizational inputs into safety performance outcomes. A model explaining the relationship between key characteristics of low-cost carriers and a higher performance standard is presented.

INTRODUCTION

The findings of this study appear to be inconsistent with public perception in many countries, which has been conditioned by the idea that as low-cost carriers focus on the "bottom line" to lower costs, these reductions may impact internal processes, such as safety, in a negative manner. Recent low-cost airline accidents, for example the total loss of a Helios Airways B737 on 14 August 2005, have resulted in renewed speculation about the safety performance of low-cost carriers. It is important to note, however, that not all carriers offering low fares follow the LCC business model, as will be explained later. Moreover, simply because they label themselves as low cost does not necessarily mean that they are indeed successful low-cost operators.

Several civil aviation authorities around the world publish information on "blacklisted" operators.[ii] Some of these operators are LCCs. Furthermore, Directors General of Civil Aviation from Contracting States of the International Civil Aviation Organization (ICAO) meeting in Montreal, Canada, (20-22 March 2006) agreed to post results from the Organization's Universal Safety Oversight Audit Program (USOAP) on the ICAO public website.[iii] At the conclusion of the conference, 70 States authorized ICAO to publish the information. Summary safety reports that will be published on the ICAO website will cover eight areas: a. aviation legislation; b. operating regulations; c. structure of the civil aviation administration and safety oversight function; d. technical guidance material; e. technical personnel; f. licensing and certification obligations; g. continuing surveillance obligations; and h. resolution of safety issues. States will be able to add complementary data to help evaluate the level of safety in their country.

[ii] See: the French Civil Aviation Authority's (Direction Generale de l' Aviation Civile) website (http://www.dgac.fr), as an example. The French Civil Aviation Authority was one of the first regulators around the world to publish a list of "blacklisted" airlines.

[iii] See: ICAO News Release (PIO 04/06). Directors General of Civil Aviation Agree on Greater Transparency and Sharing of Information. Montreal, Canada, 22 March 2006.

From the launch of the Program in January 1999 to the end of 2004, 181 Contracting States were audited and 163 received follow-up audits based on State action plans to correct deficiencies.

In addition, the International Civil Aviation Organization together with the International Air Transport Association (IATA) have agreed to share safety-related information from their respective audit programs in their effort to better identify potential safety risks and prevent air carrier accidents. Under a Memorandum of Cooperation, each organization will provide the other with information from safety oversight audit results, as well as accident and incident monitoring. Also, experts from each organization will be allowed to participate as observers in audit missions of the other.[iv]

The IATA Operational Safety Audit (IOSA) program was the first global standard for airline safety management. Since its inception in 2003, over 150 airlines representing 70% of international scheduled traffic have been IOSA audited and there are close to 100 airlines in their Registry. The IOSA Registry is publicly accessible on the IATA website. It complements ICAO's USOAP, is recognized by many governments, and will be a condition for membership in IATA by the end of 2007.

In an effort to understand better how and why the above mentioned public perception about LCCs and safety may or may not be valid, let us examine what safety is and how it is linked to organizational effectiveness in the case of air carriers. Safety is a very important factor in the airline industry. It is the cornerstone to any aviation operation and expected by customers, governments, and the public in general. Aviation safety, commonly perceived as lack of accidents[v] or incidents (including near misses), is primarily achieved by an organization through compliance with prescribed standards. Airlines are subject to strict regulatory oversight from their national authorities, which prevents air carriers from deviating from safe operating standards. Furthermore, in addition to the above mentioned airlines, their suppliers are also constantly audited by regulatory agencies, manufacturers, and other airlines, often following international standards such as IATA´s Operational Safety Audit Program. They are under significant pressure to conform to strict standards.

Likewise, regulatory agencies themselves are overseen by ICAO´s Universal Safety Oversight Program. USOAP consists of regular, mandatory, systematic and harmonized safety audits carried out by the ICAO Secretariat in its 189[vi] Contracting States. The audits assess the level of implementation of ICAO Standards and Recommended Practices, identify safety concerns or deficiencies, and provide recommendations for their resolution. As a result of standardization initiatives, such as ICAO´s Standards and Recommended Practices and other regulatory oversight, the airline industry has achieved considerable safety improvements since the 1960s. During these last decades, international aviation has witnessed a decrease in the rate of civil aviation accidents.[vii]

Of course, operators are still prone to errors that are not always preventable through regulatory oversight. Despite this, the carrier is still responsible to follow safe operational practices to prevent accidents or incidents and is mandated by its national authority to monitor its internal processes constantly to ensure that deviations are adequately addressed. For instance, complying with prescribed maintenance standards could, theoretically, maintain the probability of an accident due to mechanical failure at 1E-9 (1 event per 100

[iv] See: ICAO News Release (PIO 05/06). *ICAO and IATA Agree to Share Information from Safety Audits*. Montreal, Canada, 31 March 2006.

[v] ICAO defines an airplane accident as the following: an occurrence associated with the operation of an airplane that takes place between the time any person boards the airplane with the intention of flight and such time as all such persons have disembarked, and in which 1) the airplane sustains substantial damage; 2) death or serious injury results from being in or upon the airplane, direct contact with the airplane or anything attached thereto, or direct exposure to jet blast.

[vi] This number is current as of the date of authorship of this paper. See: http://www.icao.int.

[vii] Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations 1959 – 2004, Boeing Commercial Airplanes, May 2005.

million opportunities). This is the acceptable level of safety risk for an individual catastrophic failure, as defined by national authorities during aircraft certification.

An airline is required to manage its operations adequately to ensure that its service (air transportation) is delivered in an efficient manner in order to satisfy stakeholder expectations. As an intricate network of departments, employees, contractors, and regulators interacting with each other, an airline, in order to conduct a safe operation, needs to understand the complexities associated with its operations and develop, implement, and monitor control systems that will ensure compliance with safety standards. Moreover, the management of safety requires the organization to manage proactively hazards particular to its operations. Safety management has been recognized as a key aspect of an airline's operation and is now a regulatory requirement in countries like Australia, Canada, and the United Kingdom. It is now recognized that the implementation of a safety management system (SMS)[viii] is a contributor to further reductions in aircraft accidents and incidents.[ix] Thus, we propose that an adequate management of safety is an indicator of the performance of an organization.

There are two indices to consider for measuring safety performance: accident rate and incident rate per departure. We have obtained the rate of accidents per million departures as well as the rate of incidents per million departures. Although it is generally accepted that only 60% of aircraft accidents can be attributable to the airline,[x] it is assumed that the carriers in this study are equally exposed to external hazards; in other words, they are subject to the same operational conditions. We have also used the rate of incidents per million departures to obtain performance measurements from carriers that have not had accidents because as a safety performance indicator these incidents can be a reflection of escape systems or control systems an airline has in place.

To observe if safety performance corresponds with other performance indicators, we have measured another set of indicators closely related with the customer experience. We have considered only on-time performance as performance indicators related to customer perception. Since customer preference for an airline is driven by the schedule offering (Carrier, 2003), we believe that compliance with the published schedule is a primary performance index. We have chosen two indices: on-time performance (OTP) and schedule compliance.

OTP depends mostly on variables external to the airline, such as weather, security, and air traffic congestion. On average, only 4.44%[xi] of schedule deviations are attributable to the airline. However, strategic choices such as airport selection, ground handling providers, and route selection are factors under the control of the carrier and might have an impact on on-time departures. On the other hand, the schedule compliance index is affected by the number of cancelled flights, which is more closely linked to the airline's ability to align its operations with the published schedule. This reflects the ability of the carrier to manage its internal processes to ensure that all elements (e.g. aircraft availability, crew scheduling, ground handling services, etc.) affecting the operation are in place. We believe that an airline's on-time performance record might be partly a result of the effectiveness of the airline's management system, which includes the kind of business model chosen.

LITERATURE REVIEW

According to the academic discipline from which they originated, definitions of organizational culture vary. Business schools have the tendency to define organizational culture as phenomenon that can be managed, yet sociologists and anthropologists stress the uniqueness of individual organizations. The latter believe this uniqueness is a historically

[viii] For national authorities, a draft Safety Management Systems manual has been released by ICAO (Doc 9859).

[ix] The facts in this paragraph have been provided by Haile Belai, Chief, Universal Safety Oversight Audit Section in an interview with Triant Flouris on 1 October 2005 in Montreal, Canada.

[x] Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations 1959 – 2004, Boeing Commercial Airplanes, May 2005.

[xi] Source: Bureau of Transportation Statistics: http://www.transtats.bts.gov/OT_Delay/OT_DelayCause1.asp, April, 2005.

derived subjective phenomenon that goes beyond simple management. At the same time, organizational psychologists with an empirical background believe that organizational culture can be broken down in its component parts and then studied part by part.[xii]

We define organizational culture as the values, beliefs, assumptions, rituals, symbols, and behavior that define an organized group, especially in relationship to other organized groups. The visible part of organizational culture consists of observable behaviors and recognizable manifestations, for instance members' uniforms, symbols and logos, organizational routines and rituals, and printed documents. At its most fundamental level culture consists of the values, beliefs, and the subconscious assumptions that provide the logic which guides the members' behaviors.

The management of safety in the aviation industry has been linked to organizational culture. In fact, the proactive management of safety, including SMS initiatives, are dependent on the establishment of a hazard reporting culture (Reason, 1998). The important aspect of organizational culture vis-à-vis aviation safety outcomes is the underlying or deep culture. The visible aspect of culture is only procedural and is based on an organizational symbology. For instance, an employee, who is dissatisfied with his organization and not performing his duties to high standards, will still wear the company uniform to work. Therefore, in this scenario, the values, beliefs, and subconscious assumptions of the employee, vis-à-vis his organization, are less than optimal and yet his appearance will appear normal.

The cultural strength of an organization has been defined by researchers in organizational management, sociology, and anthropology in a variety of ways. It has been defined as coherence (Deal and Kennedy, 1982), homogeneity (Ouchi and Price, 1978), stability and intensity (Schein, 1992), congruence (Schall, 1983), and internalized control (DiTomaso, 1987). Cultural strength relates to whom and how many accept the dominant values, how strongly these values are held, and how long the values have been dominant (Gordon & DiTomaso, 1992). The underlying concept to cultural strength is the way in which employees accept these values, which is to say that employees must substantively believe in their organizational culture in order for the culture to be successful.

To believe in a company's organizational culture substantively, an employee must be convinced of the superiority of this culture, and this culture must conform to her personality and national culture. However, this is complicated for organizations that exist in multicultural states[xiii] and companies that rely on expatriate personnel, thereby bringing a multitude of people from diametrically different cultures, ethnicities, and nations under one organizational rubric. Does cultural homogeneity actually have an impact on organizational performance? Using an operationalization of cultural strength,[xiv] two longitudinal studies have shown that a strong culture (where employees share the same cultural identity) is predictive of organizational performance as measured by short-term profits and growth in assets (Denison, 1990; Gordon and DiTomaso, 1992).

We cannot make similar claims about the relationship between cultural homogeneity and organizational behavior and flight safety because it has not been tested. However, if the assumptions of this paper are correct vis-à-vis the relationship of organizational behavior based on organizational culture and safety, then a careful study linking organizational behavior and safety will demonstrate the validity of our assumption. A research project as such will be

[xii] Specific academic works corroborating these definitions per discipline follow in subsequent paragraphs.

[xiii] Our opinion on this subject is different than what the literature asserts. We do not believe multicultural states to be a major problem because in these diverse states the relevance of a national culture, which goes beyond cultural or ethnic diversity, unifies people under one national framework. In other words, national culture is more important than any sub-culture in guiding people's actions in organizational settings. The United States is a good example of such a case.

[xiv] Cultural strength was measured based on the consistency rather than the content of employee responses to survey items about organizational culture.

valid and provide airlines with the evidence and procedures they will need to implement organizational behavior changes to aid their respective organizational cultures for the ultimate goal of safety.

METHODOLOGY

We grouped the airlines that comprise our sample into three categories for purposes of comparison: mainline carriers, low-cost carriers, and regional carriers. We will attempt to associate these categories with different business models and assert that each of these groups exhibit different behavior in terms of their strategic choices and organizational performance.

The selection of the airlines studied was not random. Rather, the major criteria used for this selection was availability of data as well as volume of flights. Obviously, airlines for which data was unavailable or was incomplete could not be studied. Furthermore, studying airlines with the highest volumes of flights was necessary from a statistical analysis perspective so that the consistency of comparison and the highest possible validity was assured for our sample. Charter airlines were not included in the sample for two reasons. First, published data for charter carriers is not of good statistical quality, and, second, the regulatory framework that governs charter airline operations is not harmonious to that of scheduled carriers; thus, any comparisons would be unreliable.

Therefore, in constructing the study's sample, we used 13 U.S. scheduled carriers with the highest volume of flights per year for the period 2000-2004. For the mainline carrier group, we used the top five scheduled carriers in the U.S. by number of departures. We retained only the top four low-cost carriers (as defined by the FAA classification) due to limited availability of data for a fifth subject. Similarly, we used the top four regional carriers by number of departures. Data was filtered to retain only scheduled revenue departures (charter operations performed by scheduled carriers were not included in this study).

We utilized the on-time performance database published by the Bureau of Transportation Statistics (BTS) in order to collect on-time performance and compliance schedule variables. For the purposes of our study and for analytical purposes, we define on-time performance as the ratio between the number of flights that arrived on time (within 30 minutes of the scheduled arrival time) and the total number of scheduled flights. Schedule completion percentage is the ratio between the number of flights scheduled and the number of flights completed.

On-time performance and schedule compliance were obtained from the "Airline On-Time Performance Data" database from the Transtats website, published by the BTS.[xv] OTP was calculated by obtaining the number of late flights (more than 30 minutes of the scheduled departure time) by carrier. Monthly results were collated by carrier to obtain annual figures by using a pivot table in a spreadsheet. In a similar manner, traffic data (number of departures) was obtained from the "Air Carrier Statistics (Form 41)" database from the Transtats website, published by the BTS. Finally, the OTP for each carrier, by year, was obtained by calculating the ratio between the number of on-time flights and the total scheduled revenue departures.

Schedule compliance figures were also obtained from the OTP database from the Transtats service. Monthly figures by carrier were obtained by using a pivot table in a spreadsheet. OTP figures were pooled by group by considering each group as a single carrier (adding all the departures) rather than obtaining an average of their individual results. The schedule compliance index was obtained by averaging yearly results of the airlines within the group.

Furthermore, the FAA's accident and incident database provided good quality data on airline incidents from 2000-2004, which were attributable to scheduled carriers chosen for the study. From the National Transportation Safety Board's database, data on accidents occurring between 2000 to 2004 were extracted that were attributable to the air carriers chosen based on the above described criteria. The events from September 11, 2001, were excluded from the

[xv] http://www.transtats.bts.gov/OT_Delay/OT_DelayCause1.asp, April, 2005.

study as they would add a significant bias to the comparison. Filtering the data by using a database application, the number of accidents and incidents for this five-year period were obtained. The index was produced by dividing these figures by the traffic data obtained previously. We have adjusted the figures to use number of accidents and incidents per million departures to make the data comparable with international publications.

The data obtained for safety and on-time performance and safety indices for both individual airlines and control groups from January 1, 2000, to December 31, 2004, has been collated, and the results are shown in tables 1 and 2.

RESULTS

Table 1. *Comparison of pooled performance indicators for three carrier types (2000-2004)*

Carrier Type	ACCIDENT RATE (Per million departures)	INCIDENT RATE (Per million departures)	On-Time Performance	Schedule Compliance
Mainline carriers	4.98	31.29	80.8%	97.54%
Low-cost carriers	2.38	13.91	82.4%	99.43%
Regional carriers	3.91	22.88	79.5%	98.37%

Table 2. *Comparison of performance indicators among individual airlines (2000-2004)*

Carrier	ACCIDENT RATE (Per million departures)	INCIDENT RATE (Per million departures)	On-Time Performance	Schedule Compliance
Mainline carriers				
Airline 1	6.91	28.17	81.2%	97.40%
Airline 2	4.42	24.93	78.5%	95.81%
Airline 3	4.19	34.55	80.7%	97.78%
Airline 4	6.14	33.79	82.1%	98.02%
Airline 5	1.77	38.88	82.2%	98.69%
Low-cost carriers				
Airline 6	1.65	13.39	82.6%	98.82%
Airline 7	-	25.47	83.6%	99.79%
Airline 8	13.02	19.53	79.2%	99.53%
Airline 9	6.91	6.91	81.0%	99.56%
Regional carriers				
Airline 10	2.68	18.75	81.1%	99.27%
Airline 11	4.34	31.49	79.7%	96.60%
Airline 12	3.63	18.17	78.7%	98.98%
Airline 13	3.59	1.80	78.4%	98.62%

DISCUSSION

This exploratory study suggests that low-cost carriers might be able to achieve a better organizational performance than mainline or regional carriers due to their strategic choices and organizational cultures. One important point of explanation in the research is that national authorities classify, in the LCC category, airlines that have not fully followed the low-cost business model. However, in this study we only consider two airlines in the U.S. as true low-cost carriers, Airline 6 and Airline 7. Their strategic choices include aspects such as extended fleet utilization, a primarily third-generation aircraft fleet, and a simplified business structure. We hypothesize this might improve visibility of internal processes and enhance safety performance.

We have noted that the four performance indicators vis-à-vis safety and operational performance are in line with the three control groups (mainline, LCC, regional). LCCs are consistently superior to mainline carriers and regional airlines in all four indicators, and, consequently, safety performance is notably superior in the LCC group. Looking at individual carriers, it appears that the results are equally consistent, with only one exception.

Table 3. *Comparison of the three business models*

	Fleet utilization	Choice of airports	Fleet planning	Cost focus
Mainline	8-11 hours per day	Hubs and main city airports, some secondary airports connected to hubs	Fleet mix to match demand by route/schedule	Some frills, diverse network
LCC	12+ hours per day	Typically secondary airports	New generation, mostly single-type aircraft fleet	No frills, simplified business structure
Regional	13+ hours per day	Hubs, main city airports, and secondary airports	1-3 aircraft types	Dependant on mainline carriers' contracts

CONCLUSION

The results obtained by this study show that carriers successfully following a low-cost business model consistently exhibit better performance in both safety and operational indices. Strategic choices made by low-cost carriers might influence performance due to several factors. First, fleet choice, newer (third generation) aircraft, are less prone to accidents[xvi] than first and second-generation aircraft. Secondly, a single aircraft type might have more impact on operations than just economies of scale. Unexplored issues, such as the avoidance of constant flight crew training transitions between aircraft types, might influence (i.e. reduce) crew-related incident or accident. This is particularly relevant considering that flight crew related events account for 54% of all aircraft accidents.[xvii] Other strategic choices made by following a low-cost business model might also help explain the better on-time performance figures, such as the choice of less congested airports, simpler organizational structures, and a focus on aircraft turnaround.

There are several issues that airlines need to address in order to enhance their safety training by basing it on a strong organizational culture basis and, thus, contributing to their overall safety and operational efficiency records.[xviii] As a first step, clear organizational standards[xix] and policies need to be set. These standards need to be clear enough so that they explicate the airline's goals and procedures, not only by obeying regulatory standards but also by proactively managing safety. Company publications and other documents can provide an opportunity to strengthen company culture by articulating the values and establishing the norms. Moreover, management always needs to establish a proper tone and thoughtful approach to its intra-company communications, sending messages centered around building community

[xvi] Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations 1959 – 2004, Boeing Commercial Airplanes, May 2005.

[xvii] Ibid.

[xviii] For a detailed discussion of links between organization culture and airline safety performance see: Flouris, T. "Organizational Behavior as the Answer to CRM Effectiveness: The Creation of a Company Culture." *Conference Proceedings*, Fourth Global ICAO Flight Safety Symposium, Santiago, Chile, 12-15 April 1999.

[xix] One example would be Standard Operating Procedures (SOPs) on crew behavior, flight safety, intercultural sensitivity, etc. that help achieve organizational standards, that is, company values and norms.

through "we" rather than the divisive "us vs. them" attitude. Multicultural and unicultural airlines, low-cost and mainline carriers, and large and small airlines should all be explicit with their directives. Airlines should adopt a "best practices" approach to standards and procedures to allow all employees to focus on the important outcomes.

Airlines should also use systems and procedures as well as training (as they do already) toward the achievement of effective safety management and, ultimately, safety. Technical skills training should remain true to its core focal point, which are technical skills. The major mistake some airlines make is to assume that Safety Management can be taught as a technical skill. Certain aspects of aviation safety are improved by technical skills,[xx] but safety itself as an outcome is a behavioral pattern and presupposes technical proficiency. In other words, safety outcomes can be achieved through a safety attitude, and crewmembers must be predisposed to accept this attitude and, through training and thoughtful understanding, help it flourish.

The history of the airline is very important in determining the shape and magnitude of its training programs. An old, established carrier would have different demands than a new carrier; a low-cost airline will have a different training program than a mainline carrier since one core aspect of the LCC business model is cost minimization achieved by outsourcing of as many functions as possible. In addition, whether an airline has been subject to a cohesive historical background rather than the product of mergers is also very important. Airlines that have come to exist as products of mergers normally have a harder time with the cohesion and implementation of procedures since, in certain cases, the airlines that merged may have had many managerial and other incompatibilities.

The size of an airline is also an important discriminating factor in the implementation of Safety Management programs. In addition, the country of origin of an airline is important due to regulatory frameworks and governmental involvement in the industry or even the airline itself. For example, flag carriers owned and operated by governments often have structures that resemble civil service structures. Training must comply and be compatible with these realities and cater to the existing type and strength of the airline's organizational culture.

[xx] For example, consider the use of specific codified language to describe certain situations and crew actions in an effort to minimize miscommunication based on linguistic misunderstanding.

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Usefulness of Collegiate Aviation Publications: What Aviation Educators Say

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ABSTRACT

Evaluations of refereed 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.

BACKGROUND

The milestone marking aviation education's entrance into academia was the Civilian Pilot Training Act of 1939. Civilian Aeronautics Authority's (CAA) Robert H. Hinkley's goal was the "air-conditioning" of the United States—that of "imprinting young Americans with the wonder of flight, its unlimited potential" and "shaping the thinking of young people in 'aeronautical terms'" (Johnson, 2005, p. 8; Preston, 1998; Wilson, 1979). While aviation education programs could be found at such campuses as Auburn University and Parks College prior to 1939, the Civilian Pilot Training Program (CPTP) (later renamed the War Training Service (WTS)) introduced flight education to over 400 colleges and universities throughout the United States (Wilson, 1979).

The post-WTS/World War II era led to the formation of the National Association of University Administrators of Aviation Education (NAUAAE). Its purpose was to promote collegiate aeronautical education and, at its first annual meeting in 1948, the NAUAAE adopted a mission statement focused on educating:

> A new generation of youth, graduating from the high schools and colleges each year, with a thorough grounding in and understanding of the airplane and its social, scientific, political, and economic influences upon living will, through the years, establish an informed public opinion on aviation which will go far toward eliminating many of the present day problems which beset the aviation industry and the national defense (*University Aviation Association (UAA) Timeline*).

The following year NAUAAE changed its name to the University Aviation Association (UAA) and currently represents 107 institutions of higher education engaged in aviation education. Known now as the "The Voice of Collegiate Aviation," the UAA represents the interests of aviation educators worldwide (*UAA Timeline*; *The Collegiate Aviation Review (CAR)*, 2004).

As the UAA developed and matured, its members became increasingly interested in formally accrediting collegiate aviation programs and maturing the discipline by establishing a peer-reviewed, aviation periodical devoted to providing a "national vehicle for the dissemination of knowledge relative to aviation among institutions of higher education and governmental and industrial organizations in the aviation/aerospace field" (*CAR*, 2004, p. 6) . A call for papers in 1985 became the genesis of the peer-reviewed *Collegiate Aviation Review* that has continued to the present (*UAA Timeline*).

It is only in the last twenty years that other non-engineering aviation scholarly research journals began to appear. Prior to the recent emergence of new scholarly journals, aviation education researchers had only a limited number of publishing opportunities available to them. Most were found in related disciplines. In

addition, those who aspired to teach and research in aviation would do so in aviation programs that resided in diverse colleges and academic units. Some would find themselves in colleges of engineering, others in colleges of education, while others might be faculty members in a college of technology or arts and sciences. The lack of consistency and clear definition in aviation education within academia forced many faculty members to publish in journals associated with disciplines "in which their programs [were] aligned" (Kaps & Phillips, 2004, p. 27).

This lack of definition and recent emergence of aviation peer-reviewed journals has led some to define aviation education as an "emerging discipline." This is especially true when comparing it to well-established disciplines such as theology, philosophy and mathematics. Claire Aitchison, writing for the *Proceedings of the National Language and Academic Skills Conference* at La Trobe University, Australia, described non-engineering aviation education in that country as an emerging discipline and pointed out that its "defining characteristic" was its "need to be seen as viable, credible and academically rigorous" (2000, p. 4).

Toulmin characterized a mature or "compact discipline" as a set of five interconnected elements. One such characteristic describes an established discipline as one that provides for discourse among its practitioners to critically review new concepts, continuously refine the discipline's underlying tenets and ultimately yield "disciplinary loci" (1971). Such debate is most often found in its scholarly journals and practitioner-focused publications. These publications then become a repository for its practitioners. As aviation education establishes itself in academia, it must continue to advance the discipline by creating a rich repository characterized by scholarship and inquiry.

PURPOSE

The purpose of this article is to define such a repository of aviation education scholarship by those engaged in its practice. Unlike traditional studies of this nature, which base evaluations on the academic prestige or the research impact of periodicals (e.g., Heischmidt & Gordon, 1993; Howard & Nikolai, 1983), this study focuses on functional usefulness. Certainly, educators will have a direct interest in their peers' ratings of the periodicals in terms of research, outreach, and teaching merits (Gibson & Hanna, 2003).

While academic-focused publications are of value to academe, traditional periodical evaluation studies have focused narrowly on the research value of peer reviewed academic journals (Benjamin & Brenner, 1974; Browne & Becker, 1991; Heischmidt & Gordon, 1993; Hult, Neese, & Bashaw, 1997; Malouin & Outreville, 1987). More recent studies have widened the scope of evaluations, citing two main reasons. First, academic- and practitioner-focused publications both benefit educators and warrant evaluation, and second, many publications are broad based and should not be judged exclusively on their research value (Hull & Wright, 1990; Hult, Neese, & Bashaw, 1997; Mason & Steagall, 1997; Gibson & Hanna, 2003).

The analysis of periodical usefulness is presented in four major sections. The first two sections, Previous Research and Research Design, lay the foundation for the study. The third section, Results and Discussion, reveals results of the study, including periodical ratings, group comparisons, a bias analysis, and usefulness index scores. Finally the Implications and Discussion section presents insights gleaned from the study, its potential uses by key constituents, and its caveats.

PREVIOUS PERIODICAL RESEARCH

The evaluation of periodicals is neither a trivial topic nor one of exclusive interest to educators. Studies providing a benchmark of specialty periodicals can be used for a variety of purposes, in addition to those described above. The evaluation results can be used by practitioners to become more aware of valuable resources and information outlets (Fawcett, Vellenga, & Truitt, 1995), university administrators to assess faculty research performance (Hull & Wright, 1990), and periodical publishers to keep their editorial objectives and content in sync with reader needs (Gibson & Hanna, 2003; Reichenstein & Zivney, 1994).

Two previous aviation literature surveys have been published. The results of the first

study, employing a "specialized computer research criterion and key informant interviews," (Kapps & Phillips, 2004, p. 25) were reproduced by the UAA (Truitt & Kaps). The results were classified under various categories such as "Aviation Law Journalism," "Interdisciplinary Journals," and "Transportation Management Journals" (*Directory of Scholarly Journals which Publish Non-Engineering Aviation Research*, 1995). The *Directory* made no attempt to rate the journals. "Publishing Aviation Research: A Literature Review of Scholarly Journals" by Kaps and Phillips is a replication and expansion of Turitt and Kaps' original work. As in the first, it does not attempt to rate aviation periodicals but, instead, grouped them into four broad categories: "Aviation specific academically peer reviewed," "Non-aviation specific academically peer reviewed," "Aviation related journals refereed by an editorial board," and publications that do not claim to be refereed (p. 28-29).

Survey-based studies have been widely used to perform evaluations of relevant periodicals in other disciplines. In many of these studies, experts in the particular discipline evaluated periodicals using individual Likert scale assessments of quality, prestige, impact, relevance, timeliness, and/or readability (Coe & Weinstock, 1983; Heischmidt & Gordon, 1993; Hull & Wright, 1990; Malouin & Outreville, 1987).

A limited number of non-aviation studies have factored usage, readership, or popularity into their analysis (Browne & Becker, 1991; Hult, Neese, & Bashaw, 1997; Luke & Doke, 1987). These more expansive studies provide stronger and more reliable evaluations of periodical importance (Hult, Neese, & Bashaw, 1997).

Previous studies have also targeted university faculty and administrators in the relevant discipline as the survey population (Heischmidt & Gordon, 1993; Howard & Nikolai, 1983). These individuals are viewed as having the greatest familiarity with and expertise regarding the periodicals, and thus constitute the most appropriate population for evaluation studies. For example, the most recent studies of logistics periodicals targeted United States college and university professors in the logistics and transportation field (Fawcett, Vellenga, & Truitt, 1995; Ferguson, 1975; Gibson & Hanna, 2003).

RESEARCH DESIGN

Based on our goals and previous research, an expert opinion survey was developed. Key activities included: identifying relevant periodicals, designing the survey instrument, and defining the survey population (Gibson & Hanna, 2003).

First, an integrated list of 44 research journals and practitioner-oriented publications was compiled based on the two previous aviation journal studies (Kaps & Phillips, 2004; Truitt & Kaps, 1995) as well as input from 14 aviation educators. Additional suggestions resulted in a list of 56 publications. Additional information regarding these periodicals (official title, publisher name and location, and ISSN) was assembled and an alphabetized list of the periodicals and related information was created for inclusion in the survey (Appendix A).

Next, a web-based survey instrument was developed, tested, and revised. The questionnaire instructed respondents to identify up to ten periodicals that they use most frequently for their aviation research activities. Respondents were then asked to assess the merit of these periodicals using a five-point scale (1 = low and 5 = high). The factors used in this assessment were the periodical's quality of articles, its value to their aviation research activities, and its impact on the discipline. The same process and similar factors were used to collect information regarding the respondents' use and perceptions of periodicals for aviation outreach activities and aviation teaching activities, respectively. Additionally, the respondents were asked to assess the statements "I am very familiar with this periodical" and "I regularly read this periodical" for 56 publications using a five-point scale (1 = strongly disagree and 5 = strongly agree) (Gibson & Hanna, 2003) (see Appendix B).

The targeted survey population was identified by using the UAA's "Professional Membership List." The comprehensive list contains 219 U.S. and international aviation educators with 213 of those listing email addresses (97%). Because the majority of population had access to email and the internet, we chose a web-based survey format (Lyons,

Cude, Gutter, & Lawrence, 2003). An email message containing survey instructions and a link to the web-based survey was sent to each member inviting them to participate in the survey (Appendix C). Of the 213 email messages sent, six email addresses were incorrect or no longer in use. Of the total 219 members, 205 (93%) had messages delivered to their email accounts. The effective sample size, then, was 205.

The survey site disallowed duplicate entries and was left "open" for eight weeks. There were thirty-one individual responses or, a response rate of 15.1%. The response rate for PhD-granting institutions was 54.2 % (representatives from 13 of 24 institutions responded). Although the response rate is less than optimal, it is, based on the consistency of the results, sufficient to draw meaningful conclusions (Lessler & Kalsbeek, 1992, 116-117). Table 1 provides a breakdown of the respondents by category.

RESULTS AND DISCUSSION

The respondents identified and evaluated their ten most widely used periodicals in each education-related activity. In total, three top ten usage lists were created – one for research, outreach, and teaching. These lists included 56 periodicals from the periodical information sheet distributed with the survey and eight others identified by individual respondents.

In many instances, a limited number of respondents identified and evaluated a particular publication. To promote effective statistical analysis, and provide a balanced periodical ranking, only those publications identified in greater than ten percent of the three top ten usage lists are included in this examination. Summary of those periodicals identified is provided in Table 2. All periodicals involved in the research are listed in Appendix A.

A key influence on the respondents' top ten lists appeared to be each periodical's subject matter. Periodicals reflecting a wide breadth of aviation education issues were prominent in the rankings. These titles also received high and consistent mean merit ratings for quality, contribution to the discipline, and usefulness to research.

In contrast, periodicals reflecting a limited area of aviation or a complementary field received fewer respondent top ten rankings. They also tended to receive more moderate merit ratings across the three areas of evaluation. Still, these related field periodicals warranted inclusion in Table 2.

Demographic Group Comparisons

One objective of the research was to assess the institutional focus on research versus teaching. T tests on the periodical merit ratings from Table 2 were calculated to examine differences in the merit ratings among the respondents based on the following categories:

- Tenured faculty versus non-tenured faculty
- Research/balanced institution faculty versus teaching institution faculty

T-tests revealed significant differences in mean merit ratings for only three periodicals, although analyses were conducted across categories for each dimension (quality, outreach, and research). In general, there is consensus between the different categories regarding the merit of the most frequently used periodicals. Table 3 reflects the significant t-test results.

Table 1. *Survey Participation Demographics*

	Frequency (n=31)	**Percentage**
Respondent Type		
Tenured/tenure track faculty	23	74.2%
Non-tenured faculty	8	25.8%
Institutional Mission Type		
Research	2	6.4%
Balanced	15	48.4%
Teaching	14	45.2%

Table 2. *Aviation Educators' Assessment of Periodicals*

Title	Number of Appearances in Respondents' Lists	Quality of Research Mean*	Contribution to Outreach Mean	Usefulness to Teaching Mean
Collegiate Aviation Review	21	4.46	4.00	3.80
Aviation Week and Space Technology	18	4.17	4.33	4.00
Journal of Air Transportation	18	4.44	4.63	4.44
Journal of Aviation/Aerospace Education and Research	16	3.80	4.00	3.93
International Journal of Applied Aviation Studies	16	4.07	4.14	4.07
International Journal of Aviation Psychology	8	4.88	4.75	4.75
AOPA Flight Training	10	3.30	3.40	2.60
Aviation, Space, and Environmental Medicine	6	4.43	4.29	4.29
Human Factors and Aerospace Safety (Journal of Human Factors)	6	4.33	4.33	4.33
ICAO Journal (International Civil Aviation Organization)	6	3.33	3.33	3.33
Air Traffic Control Quarterly	4	3.00	3.00	3.50
Transportation Research Record: Journal of Transportation Research Board	4	3.75	3.50	3.00
Aviation Security International: The Journal of Airport and Airline Security	2	5.00	5.00	5.00
Human Factors: Journal of Human Factors and Ergonomics Society	2	4.50	5.00	5.00
Journal of Air Transport Management	2	4.50	4.00	4.50
Journal of Air Law and Commerce	2	4.50	4.00	3.50
ATEA Journal (American Technical Education Association)	2	4.00	3.50	2.00
Airport	2	3.50	3.50	3.50
Air and Space Law	2	2.00	2.00	1.50
Transportation Quarterly	1	5.00	5.00	5.00
Journal Experimental Psychology: Applied	1	5.00	5.00	3.00
Human Factors and Aerospace Safety: An International Journal	1	5.00	4.00	4.00
Journal of Aircraft (American Institute of Aeronautics and Astronautics	1	5.00	4.00	4.00

Table 2 (Continued). *Aviation Educators' Assessment of Periodicals*

Journal of Transportation Geography	1	4.00	4.00	4.00
Transportation Research	1	3.00	4.00	4.00
Journal of Human Performance in Extreme Environments	1	3.00	1.50	1.00

* Mean across three factors based on 5 point scales: 1 = Low to 5 = High

Table 3. *Demographic Group Analysis Results*

Periodical Title	Significant Difference in Activity Merit Means*		Activity
	Tenured/Tenure Track	**Non-Tenured**	
Collegiate Aviation Review	4.74	3.79	Research
Journal of Air Transportation	4.68	3.72	Research
	Research/Balanced Institutions	**Teaching Institutions**	
Journal of Air Transportation	4.54	3.84	Teaching
Aviation Week and Space Technology	3.68	4.31	Teaching

Notes: All differences are significant at $p<.05$
* Mean across three factors based on 5 point scales: 1 = Low 5 = High

Periodical Usefulness Index Development

The final objective of the research was to develop an overall assessment of each periodical's usefulness across the three dimensions of evaluation. This assessment is based on the respondents' top ten merit ratings.

Periodical usefulness is characterized as a combination of its merit and usage across the three key educational activities. The usefulness index score for each periodical was developed using the data contained in the four columns of Table 2. Each category mean was converted to a 25-point scale item in a 100-point usefulness index as follows:

> Usefulness Index Score = Usage Score + Research Merit Score + Outreach Merit Score + Teaching Merit Score
>
> Where: Usage Score = mean readership activity level x 5
>
> Research Merit Score = mean research merit rating x 5
>
> Outreach Merit Score = mean outreach merit rating x 5
>
> Teaching Merit Score = mean teaching merit rating x 5
>
> Frequency weighting = the number of respondents citing the journal in the top ten divided by the total number of respondents.

The usage and merit scores are summed and then multiplied by the frequency weighting to determine the usefulness index score.

The results of usefulness index score calculations are provided in Table 4.

Table 4 provides a number of noteworthy results and interesting insights into the perceptions

of the survey respondents. First and foremost is the usefulness index score attained by the *Collegiate Aviation Review*. Respondents perceive it as the most useful in terms of research making it the top aviation education academic journal.

Another striking result is the respondents' strong perceptions and extensive use of publications that are not traditional peer-reviewed journals. Unlike other disciplines where few if any non-academic journals achieve high rankings in these types of studies, aviation educators rate such publications highly. In fact, two of the top ten publications found in Table 4 rely upon invited articles, editorially reviewed articles, and articles by professional journalists. *Aviation Week and Space Technology* stands out among these publications, achieving the second highest usefulness index score. In addition, the usefulness index shows the respondents' proclivity to focus on broad-based issues affecting aviation education and air transportation. The expanding scope of applied aviation research, outreach, and teaching activities enhances the usefulness of such periodicals to aviation educators.

IMPLICATIONS AND CONCLUSIONS

The research presented here departs from the normal approach to journal evaluation. Two differences are worth noting– the combined evaluation of peer-reviewed journals and trade publications, and the inclusion of an overall usefulness index across three independent perspective ratings.

User Implications

Although the study population consisted exclusively of aviation educators, the usefulness index scores and related rankings present a perspective of value to various groups with interests in the discipline. These would include educators, practitioners, university administrators, and periodical administrators. The following perspectives on the varied interests are provided:

Table 4. *Periodical Usefulness Index Scores*

Title	Usage Score	Research Merit Score	Outreach Merit Score	Teaching Merit Score	Frequency Weighting	Usefulness Index Score
Collegiate Aviation Review	23.72	22.30	20.00	19.00	.68	57.8
Aviation Week and Space Technology	24.68	20.85	21.65	20.00	.58	50.6
Journal of Air Transportation	15.21	22.2	23.15	22.20	.58	48.0
International Journal of Applied Aviation Studies	16.01	20.35	20.70	20.35	.52	40.2
Journal of Aviation/Aerospace Education and Research	16.84	19.00	20.00	19.65	.52	39.2
International Journal of Aviation Psychology	12.32	24.4	23.75	23.75	.26	21.9
AOPA Flight Training	14.93	16.50	17.00	13.00	.32	19.7
Human Factors and Aerospace Safety (Journal of Human Factors)	13.64	21.65	21.70	21.65	.19	14.9
Aviation, Space, and Environmental Medicine	9.71	22.15	21.45	21.45	.19	14.2
ICAO Journal (International Civil Aviation Organization)	14.33	16.65	16.65	16.65	.19	12.2
Air Traffic Control Quarterly	13.81	15.00	3.00	17.50	.13	6.41
Transportation Research Record: Journal of Transportation Research Board	9.30	18.75	3.50	15.00	.13	6.05

Aviation educators - The broad spectrum of highly rated publications suggests that it is possible for aviation educators to find relevant information for their research, outreach, and teaching activities. In addition, aviation educators are not limited to narrowly defined topics or publication sources for presenting their research. The results imply that researchers can contribute significantly through varying types of publications. In addition, the results could be used as another means of benchmarking performance and developing a focused list of outlets for future publications.

Aviation practitioners - While management may not directly conduct research, management frequently is involved in training, sharing perspectives in conferences, undertaking collaborative initiatives, and other industry-related endeavors. Hence the publication scores and rankings that contribute to teaching and outreach activities are of particular value. Being exposed to those publications found most valuable to their academic counterparts could help management improve the efficiency of their information searches and aid in obtaining effective instructional and outreach materials.

In addition, the research results can serve two other purposes for practitioners. First, Appendix A provides managers with an extensive list of relevant publications. This list can be consulted when making subscription purchase decisions. Second, the results provide insight regarding the research, outreach, and teaching focus of aviation educators. Management would find this information useful since they depend on academe to prepare future leaders for professional careers in aviation.

University administrators - In many institutions, department chairs and other administrators charged to evaluate aviation faculty performance lack familiarity with the field. This research provides an external source of information regarding the usefulness of peer-reviewed aviation education journals. These usefulness ratings could be used as one of several inputs in the development of a reference list of research publications for their faculty. However, administrators should hesitate using these results solely as many prestigious journals simply do not have broad appeal and, as a result, did not receive a usefulness index score. Appendix A reveals that some of these journals have strengths in a particular activity that should be recognized accordingly.

Administrators should also take note of the types of publications aviation educators find to be most useful. The results suggest that practitioner-focused periodicals and related field journals are important to not only research but the outreach and teaching responsibilities of most aviation education faculty. Additionally, article publications in these venues are valuable when considering applied scholarship according to the primary accrediting agency for university business programs (*Association to Advance Collegiate Schools of Business International*, 2001). Administrators should weigh this combination of peer value and intellectual contribution accordingly when evaluating faculty participation in these non-traditional forms.

Publications administrators - The limit of narrowly focused academic journals and practitioner publications in the rankings serves as a caution to publishers and editors. The influence of a wide spectrum of aviation issues on the respondents' activities may suggest a change in subscriptions and article submissions. Editors who have limited the scope of their publications may need to adapt to a change in trends so as to insure relevance to the discipline and financial viability. Strategic changes might include developing editions devoted to special topics, seeking opportunities to publish jointly with other periodicals, or electing a fundamental change in the publication's professional focus.

Research Limitations

Although efforts were made to achieve reliable, valid, and unbiased results, the structure of the sampling, the scope of publications considered, and the justification to generalize the research results represent possible limitations which the authors wish to acknowledge.

First, the sampling of aviation educators could be viewed as too narrow. However, given the research objective to evaluate publications relevant to the non-engineering aviation education discipline – aviation educators were the logical target population. With the response rate achieved, the authors are of the view that that the results sufficiently represent aviation

educators' perceptions of journal usefulness for conducting aviation education research, outreach, and teaching activities.

Second, the inclusion of some non-aviation journals in the study could be viewed as problematic. Considering the survey population, it was expected that widely distributed aviation periodicals would receive higher usefulness index scores than non-aviation periodicals because of their application and relevance. Hence, the authors made no direct comparisons of the usefulness indices; the mere appearance of these related field journals among those listed underscores the positive findings.

Considering the original focus of the research, the results should not be broadly interpreted. The rankings may not represent the periodical usefulness views of educators who work primarily in other fields but periodically are involved in aviation education activities. Their perceptions of aviation and interest areas may lead these educators to use a vastly different group of periodicals. Also, the usefulness index scores apply specifically to aviation education activities and are not necessarily transferable to related disciplines. The scores reported in this study do not necessarily reflect journals' value for other management activities.

Future Directions

While these limitations do not detract from the value of the current study, they suggest two opportunities for future research. First, expanding the survey population to include aviation educators from different cultural and organizational environments and aviation and air transport practitioners would strengthen the depth of the current enquiry. Second, a study spanning two to three years may identify trends and changes in aviation education periodical usefulness and would be useful to aviation educators given the lack of research history within the discipline. New publications and information outlets will come forth to play a significant role in aviation education educators' activities.

In summary, this research constitutes an initial effort to identify periodical usefulness for the discipline, it aids in evaluating new periodicals that may emerge, and it helps focus on non-engineering, aviation-related issues. It initiates a crucial step in achieving the academic status of a recognizable discipline by defining periodical usefulness, providing crucial information for key stakeholders charged with faculty evaluation, and without question, it suggests opportunities for extending the research in order to gain a longitudinal perspective and a view of the evolving scope of the discipline.

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APPENDIX A - Journal Titles

1. Air & Space Law
2. Air and Law
3. Air Safety Forum
4. Air Traffic Control Quarterly
5. Aircraft Technology Engineering & Maintenance
6. Airport
7. Airport Press
8. Annals of Air and Space Law
9. AOPA Flight Training
10. ATEA Journal (American Technical Education Association)
11. ATEC Journal
12. Aviation Security International: The Journal of Airport & Airline Security
13. Aviation, Space, and Environmental Medicine
14. Aviation Week & Space Technology
15. Collegiate Aviation Review
16. Defense Transportation Journal
17. Human Factors and Aerospace Safety (Journal of Human Factors)
18. Human Factors and Aerospace Safety: an international journal
19. Human Factors: the journal of the human factors and ergonomics society
20. I C A O Journal: (International Civil Aviation Organization)
21. IEEE Transactions on Systems, Man, and Cybernetics
22. International Journal of Applied Aviation Studies
23. International Journal of Aviation Psychology
24. International Journal of Human Factors Modelling and Simulation
25. International Journal of Industrial Engineering: theory, applications and practice
26. Journal of Advanced Transportation
27. Journal of Air Law and Commerce
28. Journal of Air Transport Management
29. Journal of Air Transportation
30. Journal of aircraft (American Institute of Aeronautics and Astronautics)
31. Journal of Aviation/Aerospace Education & Research
32. Journal of Avionics Education
33. Journal of Experimental Psychology: Applied
34. Journal of Hospitality and Tourism Education
35. Journal of Human Performance in Extreme Environments
36. Journal of Industrial Engineering
37. Journal of Transportation Geography
38. Journal of Transportation Law, Logistics and Policy
39. Journal of Transportation Management
40. Journal of Transportation Research Forum
41. Journal of Travel and Tourism Marketing
42. Journal of Travel Research
43. Knowledge, Technology & Policy
44. Lawyer Pilot's Bar
45. Online Journal of Space Communications
46. The Air and Space Lawyer
47. Tourism Management
48. Transport Management
49. Transport Policy
50. Transport Reviews
51. Transportation Journal
52. Transportation Law Journal
53. Transportation Practitioners Journal
54. Transportation Quarerly
55. Transportation Research
56. Transportation Research Record: Journal of the Transportation Research Board

APPENDIX B

EVALUATING THE USE OF AVIATION JOURNALS FOR RESEARCH, TEACHING AND OUTREACH ACTIVITY

1. Please identify the ten periodicals that you use most frequently in your research activities (e.g., generating research agenda, conducting literature review, etc.). Then rate each periodical on the factors provided in each column.

Pick a Journal title from the drop down list or if not listed please provide the title in the text box.	Quality of articles Low ⟷ High	Impact on discipline Low ⟷ High	Value to your research Low ⟷ High
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○

2. Please identify the ten periodicals that you use most frequently in your outreach activities (e.g., advising organizations, developing training programs, preparing presentations, etc.). Then rate each periodical on the factors provided in each column.

Pick a Journal title from the drop down list or if not listed please provide the title in the text box.	Quality of articles Low ⟷ High	Impact on discipline Low ⟷ High	Value to your outreach Low ⟷ High
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○

Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○

3.Please identify the type of course in which you most frequently use Aviation periodicals (other than textbooks). Note: if you do not teach a particular course type, please do not consider it. (check one)

○ Doctoral seminars
○ MBA/MSc courses
○ Undergraduate

4. Using your response to Question 3 as your frame of reference, please identify the ten periodicals that you use most frequently in your teaching activities (e.g., preparing for class, assigning readings to students, etc). Then rate each periodical on the factors provided in each column.

Pick a Journal title from the drop down list or if not listed please provide the title in the text box.	Quality of articles Low ⟷ High	Impact on discipline Low ⟷ High	Value to your teaching Low ⟷ High
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○
Pick One Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○

5. What type(s) of Aviation programs are offered at your institution? (check all that apply)

☐ Doctoral seminars
☐ MBA/MSc courses
☐ Undergraduate

6. What is the primary mission of your institution? (check one)

○ Research
○ Teaching
○ Balanced

7. Is your program accredited by the Council on Aviation Accreditation (CAA)?

☐ Yes
☐ No

8. What is your academic rank? (check one)

○ Professor
○ Associate Professor
○ Assistant Professor

9. What is your tenure status? (check one)

○ Tenured
○ On tenure track
○ Not on tenure track

10. At which level(s) do you personally teach Aviation-related courses? (check all that apply)

☐ Doctoral seminars
☐ MBA/MSc courses
☐ Undergraduate

11. Please indicate your level of familiarity, readership, and involvement with the following periodicals by filling out the table. (Notes: if you have no knowledge of a particular periodical, leave the entire row blank. If you have identified and evaluated other periodicals in this survey, use the blank rows at the end of the table to provide responses.

Periodical Title	I am very familiar with this periodical Strongly Disagree ⟷ Strongly Agree	I regularly read this periodical Strongly Disagree ⟷ Strongly Agree	I am/have been involved with this periodical
Air & Space Law	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Air and Law	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Air Safety Forum	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Air Traffic Control Quarterly	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Aircraft Technology Engineering & Maintenance	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Airport	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Airport Press	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Annals of Air and Space Law	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer

AOPA Flight Training	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
ATEA Journal (American Technical Education Association)	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
ATEC Journal	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Aviation Security International: The Journal of Airport & Airline Security	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Aviation, Space, and Environmental Medicine	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Aviation Week & Space Technology	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Collegiate Aviation Review	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Defense Transportation Journal	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Human Factors and Aerospace Safety (Journal of Human Factors)	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Human Factors and Aerospace Safety: an international journal	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Human Factors: the journal of the human factors and ergonomics society	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
I C A O Journal: (International Civil Aviation Organization)	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
IEEE Transactions on Systems, Man, and Cybernetics	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
International Journal of Applied Aviation Studies	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
International Journal of Aviation Psychology	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
International Journal of Human Factors Modelling and Simulation	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
International Journal of Industrial Engineering: theory, applications and practice	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Advanced Transportation	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Air Law and Commerce	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Air Transport Management	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Air Transportation	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer

Journal of aircraft (American Institute of Aeronautics and Astronautics)	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Aviation/Aerospace Education & Research	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Avionics Education	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Experimental Psychology: Applied	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Hospitality and Tourism Education	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Human Performance in Extreme Environments	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Industrial Engineering	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Transportation Geography	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Transportation Law, Logistics and Policy	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Transportation Management	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Transportation Research Forum	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Travel and Tourism Marketing	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Journal of Travel Research	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Knowledge, Technology & Policy	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Lawyer Pilot's Bar	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Online Journal of Space Communications	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
The Air and Space Lawyer	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Tourism Management	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transport Management	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transport Policy	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transport Reviews	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer

Transportation Journal	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transportation Law Journal	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transportation Practitioners Journal	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transportation Quarerly	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transportation Research	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Transportation Research Record: Journal of the Transportation Research Board	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer
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Title:	1 2 3 4 5 ○ ○ ○ ○ ○	1 2 3 4 5 ○ ○ ○ ○ ○	☐ Author ☐ Reviewer

Submit

Appendix C

Dear _____,

The Department of Aviation Management and Logistics at Auburn University invites you to participate in our survey regarding aviation periodicals. Our goal is to identify periodicals that provide exceptional value and utility to academicians. Unlike previous studies that focused primarily on the research quality and prestige of academic journals, our research will investigate a wider set of issues. We hope to gain insight into the value of aviation related periodicals (both academic journals and industry publications) that are used by academicians in their research, outreach, and teaching activities. Thus, your participation is very important to the success of our study.

Survey Instructions:

1. To begin the survey, please point your browsers to http://business.auburn.edu/survey/JournalRankingSurvey.cfm. Answer the survey questions based upon your personal use of aviation-related periodicals for research, outreach, and teaching activities.

2. We have provided a general list of aviation related periodicals (in the drop-down text box) to assist you in filling out the survey. This list is based upon the input of 14 professors teaching in the field of aviation and two previously published studies. However, if you wish to include a journal or publication that is not on the list, you may do so. Please type in these titles where appropriate.

3. All responses to this questionnaire will be strictly confidential.

4. We will be pleased to provide you with a copy of the summarized results if you will furnish your email address or mailing information.

Thank you in advance for your time and effort. If you have any questions, please contact either of us.

Sincerely,

Randy Johnson and Ray Hamilton
Auburn University
Department of Aviation Management and Logistics
334-844-6822

Aviation Management Role Models in the Deregulated Era

Edwin D. Phillips
Southern Illinois University Carbondale

ABSTRACT

Aviation management students in both 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.

INTRODUCTION

Background

The challenge of managing in the deregulated era of aviation (starting October 24, 1978) is different than managing in the previous regulated era. The United States' General Accounting Office description of the changed environment is:

> The Airline Deregulation Act of 1978 phased out the government's control over fares and service and allowed market forces to determine the price and level of domestic airline service in the United States…The airline industry has undergone significant change since the late 1970s. Industry capacity and passenger traffic have tripled. At the same time, the industry's profitability has become more cyclical, and the financial health of large legacy airlines has become more precarious. Legacy airlines emerged from a regulated environment with relatively high structural costs, driven in part by labor costs, including defined benefit pension plan costs (GAO, 2006, June 9).

In this difficult business climate the aviation industry has had some very public turmoil among its leaders. CEO Jim Goodwin was forced out of United (Embattled head of United Airlines is ousted, 2001, October 29). Don Carty was forced to resign as Chairman of American (Reed, 2003, April 25). Boeing lost two CEOs. Phil Condit resigned in 2003 under pressure associated with irregularities with an Air Force contract and in 2005 Harry Stonecipher resigned under pressure for perceived personal misconduct (Isidore, 2005, March 7).

These individuals will not appear in the aviation management literature as positive role models. But, role models are important in the learning process. Professional career planners indicate role models are beneficial for new employees and students (Ezarik, 2004; Verlander, 1985). This suggests instructors in the aviation management field teaching new employees or college students should provide role models to their students.

The industry has positive role models from the era before deregulation. In the aviation history section of *An Introduction to Air Transportation* individuals are labeled as "the men who became the giants of the industry" (Wells & Wensveen, 2004, p. 46). Individuals listed are William A. Paterson, United Airlines; C.E. Woolman, Delta; Eddie Rickenbacker, Eastern, and Jack Frye, TWA. The leadership role of these individuals occurred in the early years of aviation starting in the 1930s. No individuals are identified as aviation leaders in the deregulated era.

Kaps (1997) discusses the history of the air transport labor relations environment. He separates the periods before and after deregulation but offers no suggestion as to individuals responsible for any positive industry trends since deregulation. These two nationally popular college texts are indicative of the situation that current aviation role models in the deregulated era have not been clearly identified in the aviation education literature. This situation leads to the research question*: Who are the aviation industry leaders in the deregulated era?*

Perspective

This project is limited to the aviation industry in the United States. "Aviation

industry" refers to commercial airline, corporate/business aviation or airport operations and aviation manufacturing and service companies. This view allows inclusion of possible role models from the FAA or other government agencies directly involved in civil aviation. No effort has been made to identify leaders in military aviation, individuals responsible for aircraft performance records, those primarily associated with technological development or politicians/legislators in the role of setting regulations or state/Federal policy.

Research method

Research for this project involves:

1. Literature review of information regarding role models,
2. Identification and review of national aviation sources that recognize management performance,
3. Identification and review of national business sources that recognize performance by aviation managers,
4. Personal interviews of a small group of very experienced airline managers to determine if they could and would identify industry leaders in the deregulated era,
5. An anonymous survey of another larger group of experienced senior aviation managers.

If steps 2 through 5 consistently identify the same individuals the results, based on the naturalistic research philosophy of Lincoln and Guba (1985), are valid. They indicate that when results start repeating themselves sample size is adequate and the results can be considered valid. Permission for research involving human subjects was obtained from the appropriate source before beginning this research.

IDENTIFYING AVIATION MANAGEMENT ROLE MODELS

The value of role models

Merriam – Webster online dictionary (2006a) defines a *role model* is an individual who will be imitated by others; *Worldreference.com* (2006) indicates a *role model* is someone worthy of imitation; and *Allwords.com* (2006) indicates it is someone who sets an example to follow. A common synonym is *hero*. A *hero* is an individual admired for his or her qualities (Merriam-Webster online, 2006b). A full review of the role model literature requires starting with Aristotle's *On Rhetoric* and his comments on emulation of behavior (Kristjánsson, 2006). Such thoroughness seems inappropriate for this effort. What follows, however, offers a consistent voice in support of the benefit of using the role model concept in the education process.

"Organizational behavior and career theorists have suggested that identification with role models is critical to individual growth and development" is Krumboltz's view (as cited in Gibson, 2003, p. 1). "Motivational and developmental psychology stresses the need for role models for developing individuals" (Murphey, 1996, p. 21). The Vice Commander of the Air Force Air Education and Training Command told a high school audience to choose role models who can serve as positive examples for them to follow (Agency Group 9, 2002). This sentiment is echoed by an Air Force Chief Master Sergeant writing from Iraq stating that role models are vital and necessary (Erwin, 2006). "Today's kids need heroes, but not the kind you'll see in the movies or on TV. They need role models who can help with worthy activities" (Titus, 2000, p. 3). The editor of Machine Design states "My role models taught me about management" (Khol, 2005, p. 10). "Role models can change our beliefs about what we have the capability to be and to accomplish" (Sehgal, 2004, p. 1).

Jim Collins is the author of acclaimed management books *Built to Last* and *Good to Great…Why Some Companies make the Leap and Others Don't.* In an interview he states, "We learn by stories and role models, and we need models to operate with" (Manville, 2001, 33). In their *Leadership: A communication perspective* text, Hackman and Johnson (1996) provide suggestions for shaping organizational culture. Step 4 is "Deliberate role modeling, teaching and coaching" (p. 215). Kouzes and Posner (1995), who have been recognized for their work on leadership, discuss the importance of learning from others. They indicate, "…we can learn from people without having a

relationship with them. As often as people mention learning from managers, peers, or mentors, they mention outside role models" (p. 331).

In summary, identifying role models (or heroes) is a recommended and accepted technique to aid a student's education. "…educators are in a prime position to encourage young people to understand and identify with true heroes and the values they embody" (Sanchez, 2000, 12). This concept is valid if the student is in grade school, college or an industry supervisor.

Criteria for an aviation industry manager role model

Identifying individuals who might be aviation industry role models in the deregulated era requires locating or developing criteria on which to base a selection. A search of the aviation management literature resulted in finding no published criteria for an aviation industry role model. Yet, various individuals such as Patterson at United and Frye at TWA, mentioned by Wells and Wensveen (2004), have been accepted as industry leaders without argument. Their backgrounds therefore serve as a guide. Another guiding characteristic is the description of the management process which involves the achievement of targeted organizational objectives and the processes of planning, leading, organizing and controlling as described in Phillips and Kaps (2005). This assists in identifying the managerial versus other type roles in aviation history. The author's personal twenty-nine-year management career in a major airline that spans the regulated and deregulated era also helps form the criteria. These three influences – (1) agreed upon early aviation leaders, (2) a description of management, and (3) personal managerial experience – guide in formation of the proposed criteria.

To be considered an aviation industry managerial role model a person must substantially meet these four criteria:

Criteria #1: Serves (served) in management positions directly related to producing, selling, or operating aircraft seats and cargo space in the public sector.

Criteria #2: Employees, customers, owners, shareholders and/or the general public depend(ed) on these individuals to ensure their companies or specific organization performed well. These two criteria exclude individuals such as:

- An individual known predominantly for personal performance such as Steve Fossett who has set recent world records in a balloon and airplane.
- Those known for general performance as a pilot such as Brigadier General Chuck Yeager.
- Politicians like Senator Barry Goldwater who has been recognized "for serving as an articulate spokesman for American aviation and space in the Congress and throughout the world" (NAA, 2006a, *Barry Goldwater*).
- Engineers or technological innovators such as Burt Rutan designer of unique aircraft and spacecraft.

These individuals all have a place in aviation history, but not as "industry managers."

Criteria #3: Performed over an extended period of time (i.e. five or more years).

Criteria #4: Has received national recognition from a respected source.

Identifying possible role models through national awards

The fourth criteria, has received national recognition from a respected source, proves to be the most beneficial manner of identifying possible candidates. The seven sources selected were chosen for their probable validity. They are divided into two categories. The first three are primarily aviation sourced, and the last four are based on general managerial/leadership sources.

Source #1: *Wings Club Distinguished Achievement Award winners – Appendix A* This private club was formed in 1942 in New York City for the purpose of supporting aviation (Wings Club, 2005). Juan Trippe of PanAm and Eddie Rickenbacker were early board members. Current officers include the Chairman of AirBus North America, Chairman of Air Tran, President of JetBlue, and Boeing's Vice President of Sales, Marketing and In-Service Support for the 787 (Wings Club, 2006). The Club's interest includes military aviation, aerospace, general

aviation, commercial aviation, etc. Each year an Achievement Award is presented to a distinguished member of industry. In 1978 the award was presented jointly to W. A. Patterson (United Airlines), Robert F. Six (Continental Airlines), Cyrus R. Smith (American Airlines) and Juan Trippe (PanAm). (Job titles for individuals listed in appendices are those included in the original listing and have not been adjusted to accurately reflect current positions or to highlight prior positions of possible importance.)

The annual selection process is described by Harris Herman, General Manager of The Wings Club (personal communication, March 16, 2006). The process involves the Awards Chairman and club President discussing possible candidates and soliciting names from the Club's Executive Committee and other Board members. A short list is developed and presented to the Board who votes on the nominee. The nominee is contacted to determine if he/she will accept. The credibility of this award is suggested by the 24 Board members who approve the selection. Current members include Gordon Bethune, Chairman of Continental Airlines; David Barger, President and COO of JetBlue; Jim Guyette, President and CEO of Rolls Royce of North America; Dr. George H. Ebbs, Jr., President of Embry-Riddle Aeronautical University, etc.

Source #2: *Wright Brothers Memorial Trophy Past Recipients – Appendix B.* The Aero Club of Washington (District of Columbia) was founded in 1909 (Aero Club, 2006). Knowing the diversity among the officers helps explain the club which serves as a monthly gathering of a wide mix of 500 key aviation industry representatives. The current Club president is a JetBlue executive. The past three Aero Club presidents are from three different organizations, the National Association of State Aviation Officials, the American Association of Airport Executives and the National Business Aviation Association. The Club is the host for the annual Wright Brothers Memorial Trophy which is awarded by the National Aeronautic Association (NAA) (Nancy Hackett, Executive Director of the Aero Club of Washington, personal communication, March 16, 2006).

The NAA is the oldest national aviation association in the United States. Each year, starting in 1948, the Club awards the Wright Brother's trophy "to a living individual for significant public service of enduring value, as a civilian, to aviation in the United States" (NAA, 2006b). Nominations for the Wright Brothers Memorial Trophy may be made by the general public. The Selection Committee is appointed annually by the President of the NAA and consists of seven members, which includes the President, Chairman, Administrator, or a representative of each of the following:

National Aeronautic Association
National Aeronautics and Space Admin.
Air Transport Association
Aerospace Industries Association
American Institute of Aeronautics and Astronautics
Aero Club of Washington
The Aviation Press.

The credibility of the award relates to those involved in the selection process. This group is clearly a knowledgeable, diverse and respected cross-section of the aviation industry.

Source #3: *W. A. Patterson Lecturers, Northwestern University Transportation Center – Appendix C* W.A. Patterson was "a life trustee of Northwestern and was instrumental in the establishment and strategic leadership of the Transportation Center." In 1978 the William A. Patterson Distinguished Chair in Transportation was established. Starting in 1980 an annual Patterson Lecture is held. A faculty committee participates in selection of the speaker. Criteria include recognition of the speaker as a transportation expert or leader, as well as timeliness and variety of topic (Diana Marek, Assistant Director, Northwestern University Transportation Center, personal communication, March 17, 2006). The Northwestern University Transportation Center has and does hold a respected position within academia. Since selection of speakers is primarily limited to faculty and staff of the university and because "timeliness and variety of topic" are part of the criteria this is an award with a high level of credibility but one that perhaps does not rise to the same level as the two prior awards.

Source #4: *CNN Top 25: Most influential business leaders of the last 25 years – Appendix D* CNN selected a "distinguished panel" of "experts" to select these top 25 business leaders from the last 25 years (CNN.com, 2005 June 19). CNN does not specify the specific criteria used to rank the business leaders. It seems reasonable to accept CNN's claim that appropriate individuals were used to develop this list and that the results are credible. CNN would not risk the embarrassment of an inappropriate process or selection. Other than perhaps the inclusion of Ted Turner on the list, there appears to be no possible political motivation in the selections. The 25 year time period is unspecified but covers approximately 1980 – 2005, essentially the entire period since deregulation. Those selected represent a wide range of recognized business persons.

Source #5: *Harvard Business School 20th Century Great American Business Leaders – Transportation (Harvard Business School, 2006a) – Appendix E*

Source #6: *Harvard Business School 20th Century Great American Business Leaders – Automotive and Aerospace (Harvard Business School, 2006b) – Appendix F* Both Appendix E and F are part of an effort by members of the *Harvard Business School Leadership Initiative* to identify "…20th century men and women whose business leadership shaped the ways that people live, work, and interact" (Harvard Business School Leadership Initiative, 2006, 20th Century Great American Business Leaders).

Source #7: *Top 50 Business Leaders of the 20th Century – Appendix G* The above three lists all stem from the same research conducted for *In Their Time: The Greatest Business Leaders of the Twentieth Century* (Nohria & Mayo, 2005). The book is a highly credible summary of extensive research evaluating managerial performance. The research involved surveying 7,000 American business leaders to determine their opinion about their peers. Individuals considered had to have been a chief executive officer (CEO) in a single company for a minimum of five years. (It is coincidental that the selection criteria included earlier in this article and Nohria and Mayo's research both are based on a five-year minimum period of performance.) Successful financial performance of the company, as measured by one of four specific financial metrics, is also a requirement. The authors also consulted 17 other significant research projects evaluating performance by individual business leaders.

Appendix G is the Top 50 of the 100 leaders identified through Nohria and Mayo's (2005, p. xxii) research. Only the top 50 are used here for convenience. This list of those in 51st through 100th place includes one aviation industry person, Juan Trippe, in position 91.

Some may argue that *Time Magazine, Fortune, Aviation Week & Space Technology and* other sources that provide annual awards or lists of business leaders should also have been used. The author has no evidence that using such lists would increase the validity of the response provided by the above seven lists.

SELECTING ROLE MODELS

Table 1 lists the 13 names of aviation leaders of the deregulated era that are included in one or more of the sources/appendices. An "X" under the letter of the appendix indicates the individual's name is included in that list. The company affiliation and calendar time-span have been added where not included in the original listing. Because of the differing qualifications between Appendices E and F, the maximum number of opportunities for recognition is six – only achieved by Kelleher. Seven of the above 13 individuals shown in Table 1 have received recognition from only one source. They are excluded from further consideration.

The six individuals listed in Table 2 are included in a minimum of two and maximum of six lists. They are listed in rank order based on number of awards or lists. Both Bethune and Lorenzo appear on only two lists. The two lists include one of the preeminent aviation groups (either the Wings or NAA) *and* one of the national business leaders lists. This seems adequate justification for them to be included in a final list.

Table 1. *Summary of national recognition of aviation leaders of the deregulated era.*

			Appendices						
	Name	Company and executive tenure	A	B	C	D	E	F	G
1	Gordon Bethune	Continental 1994 - 2004	X				X		
2	Donald Burr	People Express 1980 - 1986					X		
3	Edwin I. Colodny	US Airways 1975 - 1991		X					
4	Robert L. Crandall	American Airlines 1985 - 1998	X	X	X		X		
5	John C. Emery, Jr.	Emery Air Freight 1968 - 1987					X		
6	Richard Ferris	United Airlines 1975 - 1987			X				
7	Herbert D. Kelleher	Southwest Airlines 1971 - present	X	X	X	X	X		X
8	Francisco A. Lorenzo	Texas Air Company 1972 – 1990			X		X		
9	David Neeleman	JetBlue 2000 - present			X				
10	Frederick W. Smith	Federal Express 1971 - present	X	X	X		X		X
11	Harry Stonecipher	Boeing Company 1997-2002, 03-05	X						
12	William W. Winpisinger	President International Association of Machinist and Aerospace Workers 1977 - 1989			X				
13	Thornton A. Wilson	Boeing Company 1969 - 1986	X	X				X	

Table 2. *Aviation Leaders in the Deregulated Era based on national recognition.*

Aviation Leaders in the Deregulated Era		
1	Herb Kelleher	(6) (indicates number of awards)
2	Frederick W. Smith	(5)
3	Robert L. Crandall	(4)
4	Thornton A. Wilson	(3)
5	Gordon Bethune	(2)
6	Francisco A. Lorenzo	(2)

INDUSTRY VOICES

The Valentine weekend experiment

If you're in northern San Diego County over Valentine's Day weekend you'll find a group of now mostly retired airline people playing golf. In 2005 ten "airline guys" (it's traditionally been an all male gathering) plus their friends attended for the 36th year. All ten individuals are currently or were previously in managerial positions for one of the world's largest airlines, several for more than forty years. Their varied backgrounds include positions with system-wide responsibilities in various areas such as consumer relations, employment, onboard planning, contract negotiations, etc. Job titles held include vice president, director, and general manager. Airport operations managed by these individuals include small *line* stations and major U.S. and international *hub* stations. Some left the core airline and went on to significant responsibilities with other airlines (i.e. chairman of a major regional) or related industry jobs. In summary, these individuals have much industry experience and, fortunately, they are better managers than golfers.

Either singularly or in groups of two or three, each was presented the same story. "I'm doing some research for a project. Think about our time in the industry since deregulation started. Who are the key industry leaders? Who should be put in the aviation history books as

being the best aviation managers? Said another way, who should I offer to my students as role models, as industry leaders?"

The consistent initial response was silence followed by something like, "I don't know if I can." Then, as the brain shifted from golf to work, names like Donald Nyrop (Northwest), W. A. Patterson (United), C. R. Smith (American) and Juan Trippe (Pan Am) were offered with the comment that they were great but came before deregulation. After a bit more reflection the comment would be something like, "Probably Crandall. He did a great job at American. Oh, yeah, and the Southwest guy, Kelleher. That airline has done great. And Lorenzo had a helluva impact but not the best of outcomes. So, maybe Crandall and Kelleher?" The majority of responses include one or both of these individuals.

No other name was mentioned with any consistency. Dick Ferris (United) was mentioned a few times as an individual who led the fight for deregulation. "That JetBlue guy (David Neeleman), and Bethune at Continental" were mentioned by one or two individuals. No other names were offered. Perhaps in support of a friend's efforts, several responses included the unsolicited comment, "That's a good question."

Reflecting on the answers during the trip home from the outing it seemed that the question was legitimate and answerable. The five individuals identified as possible role models were Crandall, Kelleher, Bethune, Neeleman, and Ferris.

The "former" group survey

One of the many groups that use the Internet to stay abreast of a common interest is about 180 former senior managers of a major international airline. (For convenience these individuals are referred to as the *former group*.) Members must have been in a senior management position at that airline and had at least a three year separation from the company before joining the email list. (This author is one of those members.)

The business background of members of the former group make them uniquely qualified to answer research questions about industry managers. The members of the *former group* include past presidents, senior officers, directors and managers, many of which are known nationally within and outside the aviation industry. Their experience covers the spectrum of major functional areas: sales, marketing, finance, planning, law, operations, flight, onboard service, etc. A significant number of these individuals have worked at more than one aviation company. Some have prior or current experience in a wide variety of areas that support airline operations including security, cabin refurbishment, tourism, consulting, manufacturing, etc. Several members are currently chief executive officers of national aviation related companies other than airlines.

A significant number of the individuals on this email list have interacted personally with industry leaders such as Crandall and Kelleher. They have worked with them at another airline or on an industry task force or perhaps an Air Transport Association (ATA) committee. Essentially every member of the *former group* has been or is in daily competition with and frequently had or has an opportunity to observe first-hand the management style of industry leaders. Therefore names mentioned in response to the survey questions are not just people who the respondents have read about in the news. If they weren't known personally, their names and or strategies were often discussed in staff meetings, around tables in the employee cafeteria and even on the golf course.

Group members were asked by email to complete an online survey. Sixty-two percent of the respondents indicate an airline background. The remaining 38% identify themselves, spread almost equally, among the categories of government, aircraft manufacturing, airport operations, aviation service organizations, and one media representative. This demonstrates the diverse career pattern taken by individuals who at one time worked for an airline.

Eighty-one percent were able to identify "W*ho is the most influential manager in aviation since deregulation*?" Thirteen percent said no one deserved that recognition and six percent didn't know who it should be. A second question asked for the name(s) of "*Other individuals that should be on the list of top managers during the deregulated era of aviation."* Results are shown in Table 3. Individuals receiving a single recommendation

are not included. Examples are Jerry Atkin (SkyWest), Bruce Kennedy (Alaska), Jane Garvey (FAA), Joe O'Gorman (Aloha, Frontier, Reno Air, United and DHL), and Howard Putnam (United, Southwest, and Braniff).

Analysis of industry voices

The five names identified during Valentine day interviews appear on the list of individuals identified by the *former* group. Results from the experienced *former group* closely mirror the results found in the national awards. A surprising omission is Smith of FedEx. The *former group* is from a predominant passenger carrier, but many of the individuals have been responsible for results in the cargo end of the business. The failure of this group to mention Smith is not justification to question his inclusion on a list of aviation leaders during the deregulated era.

Wilson of Boeing is not mentioned by the *former group* of predominantly operational versus manufacturing managers. However, several of the members of this *former* group spent much time traveling to Boeing's facilities during aircraft purchase and development meetings. Some of these contacts were at the senior executive level. My sense is this group of primarily airline people fail to give the same consideration to Wilson's record as have others in the aviation community.

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Table 3. *Survey results of the former group.*

Rank	Name – affiliation	Number of votes received
The most influential aviation manager during the deregulated era of aviation		
1	Herb Kelleher – Southwest	(24)
2	Robert Crandall – American	(9)
3	Dick Ferris – United	(2)
Other individuals that should be on the list of top managers during the deregulated era of aviation		
1	Robert Crandall – American	(12)
2	Herb Kelleher – Southwest	(7)
3	Dick Ferris – United	(6)
4	Gordon Bethune – Continental	(6)
5	David Neeleman – JetBlue	(5)
6	Frank Lorenzo – Continental, Eastern	(5)
7	Steven Wolfe – Flying Tiger, American, United, US Airways	(4).

Neeleman is mentioned by the former group and is one of the Patterson Lecturers. *JetBlue* is now only six-years old and long term performance of both the company and Neeleman is still being determined. His business strategies continue to receive attention from the media and competitors (i.e. low-cost operation with high-cost aircraft interiors and amenities such as all aircraft equipped with live TV, reliance on automation, openness of information sharing with employees, etc.). It will be difficult to discuss aviation in the early 21st Century without close attention to *JetBlue*. It is likely, depending on the track performance of *JetBlue* in the next few years, that Neeleman will eventually be recognized by the Wings Club and or NAA. This view results in a conclusion he should be added to a final list of key aviation managers.

Dick Ferris is mentioned in the Valentine weekend experiment and the *former* survey. He is also the first Patterson Lecturer (which was probably influenced because United wrote a large check to help fund the W.A. Patterson Chair). But, he is not listed on any of the other national lists. He is an individual worth study, but does not belong on the role model list. He is

known in the industry as one of the key leaders for deregulation. However the 1985 ALPA pilot strike and United's aggressive but unsuccessful efforts to break the strike caused Ferris' subsequent departure from the airline prior to achieving his long-term personal goals of creating a multifaceted travel company (airline, hotels, rent-a-car, etc. conglomerate).

Steven Wolfe is mentioned only in the former group survey and not on any of the national award lists. His absence from any of the lists precludes his identification as a role model. Yet he is an excellent subject for research by individual students. His personal business history may be one of the more interesting and financially successful CEO careers in the industry (if an investor bought and sold at the proper times). His vision and leadership created the world's largest employee owned company, United. But it was an experiment that failed in the long-term. His varied leadership positions at a variety of airlines may make it difficult for him to be easily compared with a Kelleher or Crandall who have long roots with a singular company.

CONCLUSION

The final list

The three data sources – the award search, the interviews and the survey results – provide repetitive results complimentary results which create a meaningful list of aviation industry role models in the deregulated era. They are listed in Table 4 in alphabetical order. The repetition and consistency of results from the three sources meet Lincoln and Guba's (1985) test of validity.

Personal characteristics

An obvious question about these role models is "*What* have they done and *how* have they done it which results in personal and/or organizational achievement deserving of recognition?" Mayo and Nohria (2005) provide detailed information about the performance characteristics of managers and leaders. The various awards have some level of published criteria for selecting winners. The *former* group was asked to and provided explanation why they recognized individuals as an influential manager.

A long list of *what* is easily developed. Examples include the long-term financial success of Southwest, creation of innovative marketing concepts such as frequent flyer programs under Crandall's leadership at American, significant business turn-around as achieved by Bethune at Continental. Lorenzo created a large aviation empire and broke new ground in labor relations.

How these accomplishments were achieved is important. I refer to this as the individual's *management style*. Crandall's reputation among those in the industry is that of a tough boss. Kelleher has used a folksy image while hiding an extremely effective intellect. He epitomizes the view that the boss's job is to take care of the employees who in-turn will take care of the customer. Frank Lorenzo's managerial approach is often described with words that do not belong in an academic article.

The *what* and *how* questions which are only briefly addressed here are the basis for additional and meaningful research. A thorough investigation requires an extensive effort that does not fit within this article. But, one or more of you who read this are encouraged to accept the challenge of investigating these issues as a continuation of this project with the view of helping students identify *why* the individuals you or future textbooks identify are role models including both *what* is it they have accomplished and especially *how* have they achieved those accomplishments.

Summary

Providing students with role models is a meaningful, beneficial academic technique. The aviation business changed in 1978 and processes that worked in the regulated era require different approaches today. Aviation management students in college and industry will benefit by studying aviation role models of the deregulated era.

Seven established aviation role models are identified. All the individuals are living, and, most are still actively involved in the industry in some capacity. For example, Smith still leads FedEx. Crandall has retired from American but writes editorial opinion pieces about the industry and is now Chairman and CEO of Pogo (a new air-taxi service using very light jets) (flypogo.com, 2006). Specific study of what

these seven have accomplished and how they have accomplished is a desirable expansion of this research.

The information contained here only has value if it is shared. You are encouraged to share this information with whomever you consider might benefit. That includes students, peers, or even the general public. Our industry, which continues to face service and financial challenges, has examples of successful, strong leadership and we should use every opportunity to publicize that fact.

Table 4. *Aviation manager role models in the deregulated era.*

Name		Affiliation
1	Gordon Bethune	Former Chairman of Continental Airlines
2	Robert L. Crandall	Former Chairman of American Airlines
3	Herb Kelleher	Executive Chairman Southwest Airlines
4	Francisco A. Lorenzo	Former Chairman Texas Air Corporation
5	David Neeleman	Chairman JetBlue
6	Frederick W. Smith	Chairman Federal Express
7	Thornton A. Wilson	Former chairman Boeing Company

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APPENDIX A

Past recipients of the Wings Club Distinguished Achievement Award

Year	Recipient	Year	Recipient
2005	Sir Richard Branson	1990	Armin O. Baltensweiler
2004	Gordon Bethune	1989	Thomas H. Davis
2003	Brigadier General Charles E. Yeager	1988	The Flight Safety Foundation
2002	Sir Ralph Robins	1987	Pioneer Trans-Atlantic European Passenger Carriers
2001	Harry Stonecipher	1986	T.A. Wilson
2000	Jean Pierson	1985	The National Air & Space Museum of the Smithsonian Institution
1999	John H. Glenn, Jr.	1984	James M. Beggs
1998	Lord Marshall of Knightsbridge	1983	John C. Bierwirth Thomas V. Jones David S. Lewis, Jr. Sanford N. McDonnell
1997	U.S. Air Force	1982	Senator Barry M. Goldwater
1996	Herbert D. Kelleher	1981	Olive Ann Beech Harry B. Combs Leroy R. Grumman William T. Piper, Jr. Dwane L. Wallace
1994	Cessna Citation Special Olympics Airlift Corporate Angel Network ORBIS International Wings of Hope	1980	Sir Frank Whittle Dr. Hans von Ohain Sir Stanley G. Hooker Jack S. Parker Arthur E. Smith
1993	Robert L. Crandall	1979	William M. Allen Donald W. Douglas, Sr. Hall L. Hibbard
1992	Frederick W. Smith and the 95,000 Employees of Federal Express Corp.	1978	William A. Patterson Robert F. Six Cyrus R. Smith Juan T. Trippe
1991	Aviation Test Pilots		

APPENDIX B

Wright Brothers Memorial Trophy Past Recipients

Year	Recipient	Year	Recipient
2005	Pete Aldridge	1990	Edwin I. Colodny
2004	Bob Crandall	1989	Thomas Jones
2003	Senator John Glenn	1988	Sam B. Williams
2002	Paul Poberezny	1987	Allen E. Paulson
2001	Neil A. Armstrong	1986	Joseph F. Sutter
2000	Herb Kelleher	1985	Harry B. Combs
1999	Delford M. Smith	1984	David S. Lewis
1998	Edward Stimpson	1983	J. Leland Atwood
1997	Charles H. Kaman	1982	Dr. Willis M. Hawkins
1996	Frederick W. Smith	1981	Dwayne L. Wallace
1994	Russell W. Meyer, Jr.	1980	Olive Ann Beech
1993	A. L. Ueltschi	1979	T. A. Wilson
1992	Gerhard Neumann	1978	Senator Jennings Randolph
1991	Senator Jake Garn		

APPENDIX C

W. A. Patterson Lecturers, Northwestern University Transportation Center

Year	Speaker	Title and Sources
2005	Lawrence D. Burns	Vice President Research Development & Planning, GMC
2004	Michael L. Eskew	Chairman and CEO United Parcel Service, Inc.
2003	David Neeleman	Chief Executive Officer and Director JetBlue Airways
2002	Norman Y. Mineta	Secretary U.S. Department of Transportation
2001	Donald Schneider	President Schneider National, Inc.
2000	Frederick W. Smith	Chairman, President and Chief Executive Officer FedEx Corporation
1999	Robert Krebs	Chairman, President, CEO; Burlington Northern Sante FE Railway
1998	Lua Cheng Eng	Deputy Chairman, President and CEO; Neptune Orient Ltd
1997	Herb Kelleher	Chairman, President and CEO Southwest Airline Company
1996	John Welsby	Chairman and Chief Executive Officer British Railways
1995	William ("Gus") Pagonis	Sr. VP, Logistics, Sears, Roebuck
1994	Karel Van Miert	Commissioner of Competition for the European Union
1993	Dr. Robert Herman, L.P.	Gilvin Centennial Professor Emeritus Civil Engineering; University of Texas Austin
1992	J.B. Hunt	Chairman of the Board J.B. Hunt Transport, Inc.
1991	Heinz Ruhnau	Chairman Lufthansa German Airlines
1990	Donald (Deke) K. Slayton	Astronaut, President and Vice Chairman Space Services
1989	Sir Colin Marshall	Chief Executive Officer British Airways

1988	William W. Winpisinger	International President International Association of Machinists and Aerospace Workers
1987	Frank Lorenzo	Chairman, President and Chief Executive Officer Texas Air Corporation
1986	Robert L. Crandall	Chairman and President AMR Corporation and American Airlines, Inc.
1985	Marvin L. Manheim	William A. Patterson Distinguished Professor
1984	Dr. Daryl Wyckoff	James J. Hill Professor of Transportation Harvard U.
1982	Alfred E. Kahn	Professor of Economics Cornell U.
1980	Richard J. Ferris	Chairman and CEO United Airlines

APPENDIX D

CNN Top 25 Influential Business Leaders

1	Bill Gates	co-founder of Microsoft
2	Sam Walton	former CEO of Wal-Mart
3	Jack Welch	former CEO of General Electric
4	Warren Buffett	CEO of Berkshire Hathaway
5	Lee Iacocca	former CEO of Chrysler
6	Steve Jobs	CEO of Apple
7	**Herb Kelleher**	chairman of Southwest Airlines
8	Michael Dell	founder of Dell Computer
9	Alan Greenspan	chairman of the Federal Reserve Board
10	Carl Icahn	1980s corporate raider
11	Andy Grove	former CEO of Intel
12	Michael Milken	former junk-bond wizard
13	John Reed	former CEO of Citigroup
14	Ted Turner	founder of CNN
15	Jim Clark	former CEO of Netscape
16	Marge Whitman	CEO of eBay
17	Jeff Bezos	founder of Amazon.com
18	Michael Eisner	CEO of Disney
19	Peter Lynch	manager of Fidelity's Magellan Fund
20	Phil Knight	CEO of Nike
21	Katharine Graham	late CEO of Washington Post Co.
22	W. Edwards Deming	influential business consultant
23	Ken Lay	former CEO of Enron
24	Shawn Fanning	founder of Napster
25	Lou Gerstmer	former CEO of IBM

List published June 19, 2005, aviation related individuals **emphasized**.

APPENDIX E

Harvard Business School 20th Century Great American Business Leaders – Transportation

	Name	Aviation Company
1	**Bethune, Gordon M.**	Continental 1994 - 2004
2	Budd, Ralph	
3	**Burr, Donald C.**	People Express 1980 - 1986
4	**Carlson, Edward E.**	United Airlines 1971 - 1979
5	**Casey, James E.**	UPS 1907 - 1962
6	Clement, Martin W.	
7	**Crandall, Robert L.**	American Airlines 1985 - 1998
8	**Emery, Jr., John C.**	Emery Air Freight 1968 - 1987
9	**Emery, Sr., John C.**	Emery Air Freight 1946 - 1967
10	Flagler, Henry M.	
11	Franklin, John M.	
12	**Frye, Jack**	Trans World Airlines 1934 - 1947
13	Gray, Carl R.	
14	Hill, James J.	
15	Hill, Louis W.	
16	Holden, Hale	
17	**Kelleher, Herbert D.**	Southwest Airlines 1967 - 2001
18	**Lorenzo, Francisco A.**	Texas Air Company 1972 – 1990
19	Luckenbach, Jr., Edgar F.	
20	Ludwig, Daniel K.	
21	Mallory, Clifford D.	
22	Mallory, Henry R.	
23	McLean, Malcolm P.	
24	Norris, Ernest E.	
25	**Nyrop, Donald W**	Northwest Airlines 1954 - 1978
26	**Patterson, William A.**	United Airlines 1934 - 1963
27	**Rentschler, Frederick B.**	United Aircraft 1928 - 1934
28	**Rickenbacker, Edward V.**	Eastern Airlines 1938 - 1953
29	Shoen, Leonard S.	
30	**Six, Robert F**.	Continental Airlines 1907 - 1986
31	Sloan, Matthew S.	
32	**Smith, Cyrus R.**	American Airlines 1934 - 1968
33	**Smith, Frederick W.**	Federal Express 1973 -
34	Spencer, Samuel	
35	**Trippe, Juan T.**	Pan American World Airways 1927 - 1969
36	Underwood, Frederick D.	
37	Vauclain, Samuel M.	
38	Wallace, James C.	
39	Warfield, Solomon D.	
40	Wickman, Carl E.	
41	Willard, Daniel	
42	Young, Robert R.	

Aviation related individuals **emphasized**.

APPENDIX F

Harvard Business School 20th Century Great American Business Leaders - Automotive and Aerospace

	Name	Aviation Company
1	**Allen, William M.**	Boeing 1945 - 1969
2	Beals, Jr., Vaughn L.	
3	**Beech, Olive Ann M.**	Beech Aircraft Corporation 1950 - 1968
4	Blumenthal, W. Michael	
5	**Boeing, William E.**	Boeing Company 1916 - 1934
6	Bossidy, Lawrence A.	
7	**Braniff, Thomas E.**	Braniff Airlines 1930 - 1954
8	Budd, Edward G.	
9	Caldwell, Philip	
10	Chapin, Roy D.	
11	Chrysler, Walter P.	
12	Collyer, John L.	
13	Crawford, Frederick C.	
14	**Crosby, Joseph W.**	Thiokol Corporation 1947 - 1963
15	Curtice, Harlow H.	
16	Davis, Charles S.	
17	Donner, Frederic G.	
18	**Douglas, Donald W.**	Douglas Aircraft Company 1928 – 1957
19	Durant, William	
20	Eaton, Robert J.	
21	**Emanuel, Victor**	AVCO 1939 – 1960 Aircraft and ship manufacturing.
22	Firestone, Harvey S.	
23	Firestone, Jr., Harvey S.	
24	Fisher, Frederick J.	
25	Ford, Henry	
26	Ford II, Henry	
27	**Gross, Robert E.**	Lockheed Aircraft Corporation 1934 - 1956
28	Hertz, John D.	
29	Hoffman, Paul G.	
30	**Hughes, Jr., Howard R.**	Hughes Aircraft Company 1933 - 1976
31	Iacocca, Lido (Lee) A.	
32	Joy, Henry B.	
33	Keller, Kaufman T.	
34	Lamm, Harvey H.	
35	**Lear, William P.**	Lear 1939 - 1967

Continued on next page.

APPENDIX F CONTINUED

36	Litchfield, Paul W.	
37	**Martin, Glenn L.**	Glenn L. Martin Company 1907 – 1949
38	**McDonnell, James S.**	McDonnell Aircraft Corporation 1939 - 1967
39	McPherson, Rene C.	
40	Mott, Charles S.	
41	Nash, Charles W.	
42	**Northrop, John K.**	Northrop Aircraft 1937 - 1959
43	Olds, Ransom E.	
44	Peppiatt, Guy S.	
45	Petersen, Donald E.	
46	Pigott, Charles M.	
47	Prince, Larry L.	
48	Ramo, Simon	Thompson-Ramo-Wooldridge Corp. 1953 – 1958, Military missile and other control systems.
49	Rockwell, Willard F.	
50	Rockwell, Jr., Willard F.	
51	Seiberling, Frank A.	
52	**Sikorsky, Igor I.**	Sikorsky Aircraft 1923 - 1957
53	Sloan, Jr., Alfred P.	
54	Smith, Roger B.	
55	Stranahan, Jr., Robert A.	
56	Trotman, Alex	
57	Vaughan, Guy W.	Curtiss-Wright Aircraft Company 1935 - 1949
58	Wallace, Dwane L.	Cessna Aircraft Company 1936 - 1975
59	Wilson, Charles Erwin	
60	**Wilson, Thornton A.**	Boeing Company 1969 - 1986

Aviation related individuals **emphasized**.

APPENDIX G

Top 50 Business Leaders of the 20th Century

1	Samuel M. Walton, Wal-Mart	26	Steven P. Jobs, Apple Computer
2	Walter E. Disney, Walt Disney	27	John T. Dorrance, Campbell Soup
3	William H. Gates III, Microsoft	28	Leon L. Bean, LL Bean
4	Henry Ford, Ford Motor	29	William Levitt, Levitt & Sons
5	John P. Morgan, J.P. Morgan Chase	30	Howard Schultz, Starbucks
6	Alfred P. Sloan Jr., General Motors	31	Michael Dell, Dell Computer
7	John F. Welch Jr., General Electric	32	Robert W. Johnson Jr., Johnson & Johnson
8	Raymond A. Kroc, McDonald's	33	***James E. Casey, United Parcel Service***
9	William R. Hewlett, Hewlett-Packard	34	***Herbert D. Kelleher, Southwest Airlines***
10	David Packard, Hewlett-Packard	35	George Eastman, Eastman Kodak
11	Andrew S. Grove, Intel	36	Philip H. Knight, Nike
12	Milton S. Hershey, The Hershey Co.	37	James O. McKinsey, McKinsey & Co.
13	John D. Rockefeller Sr., Standard Oil	38	Charles R. Schwab, Charles Schwab
14	Thomas J. Watson Jr, IBM	39	***Frederick W. Smith, Federal Express***
15	Henry R. Luce, Time-Life Publications	40	William Wrigley Jr., Wm. Wrigley Jr. Co.
16	Will K. Kellogg, Kellogg	41	Gordon E. Moore, Intel
17	Warren E. Buffett, Berkshire Hathaway	42	Robert (Ted) E. Turner, Turner Broadcasting
18	Harland Sanders, Kentucky Fried Chicken	43	J. Willard Marriott Jr., Marriott Int'l.
19	William C. Procter, Procter & Gamble	44	James E. Burke ,Johnson & Johnson
20	Thomas J. Watson Sr., IBM	45	David Sarnoff, RCA
21	Asa G. Candler, Coca-Cola	46	***William E. Boeing, Boeing***
22	Estee Lauder, Estee Lauder	47	Walter A. Haas Sr., Levi Strauss
23	Henry J. Heinz, H.J. Heinz	48	Henry J. Kaiser, Kaiser Industries
24	Daniel F. Gerber Jr., Gerber Products	49	Walter A. Haas Jr. ,Levi Strauss
25	James L. Kraft, Kraft Foods	50	Clarence Birdseye, Bird's Eye Foods

Aviation related individuals **emphasized**.

Industry Members Evaluate the Strengths and Weaknesses of Aviation Management Graduates

Edwin D. Phillips
Jose Ruiz
Southern Illinois University Carbondale

Hitesh Mehta
Philadelphia International Airport

ABSTRACT

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 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 University Aviation Association (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 170 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.

INTRODUCTION

Background

The primary mission and purpose of collegiate aviation management departments is to prepare students for a position in the aviation industry (Phillips, 2004). This article is a report of the methods used and results discovered by surveying members of industry to determine the strengths and weaknesses of aviation management graduates. The purpose of the research is to provide information that may be used by aviation management departments to evaluate and, as necessary, modify course offerings. A successful aspect of any business is periodic critique of progress toward goals (Blake & Mouton, 1985). In absence of any known similar effort, it is timely to question how successful a job is now being done to prepare students for industry success.

The University Aviation Association (UAA) organized the first meeting of an Aviation Management Committee during the UAA Fall Education Conference in Toronto, October 7, 2004 under the chairmanship of Triant Flouris. One item discussed was the desirability of determining what individuals in the aviation industry thought were the strengths and weaknesses of aviation management graduates. In pedagogical terms, a timely needs assessment seemed appropriate. The answers may be used to guide decisions about curricula content and teaching methods of UAA member institutions offering aviation management degree programs. Two of the authors were in attendance at this formative meeting and accepted the challenge of initiating a research project. An overview of this project was included in Research Roundtable during the UAA Fall Education Conference in Champaign, September 30, 2005.

Research

The perspective of this research is from the view of members of an aviation management department who wish to determine if their existing course offerings are meeting industry needs. Prior research in this area has asked members of industry to identify (1) skills and knowledge desired and (2) the what types of

courses would be most beneficial. No known research has asked industry members how students are actually performing. It is anticipated that comments made regarding actual strengths and weaknesses will validate – or not – the skills and knowledge previously identified. This background leads to a three pronged research agenda:

1. Review of aviation management literature regarding desired skills and knowledge.
2. Review of general business literature regarding desired skills and knowledge.
3. A survey of members of the aviation industry regarding strengths and weaknesses among aviation management graduates.

SKILLS AND KNOWLEDGE RESEARCH FINDINGS

Aviation Management Literature

Attempting to ensure aviation management courses properly equip graduates is a sporadic but two decade long effort. Two approaches have been used, one is to determine what subject matter industry desires be taught in course offerings. The other is to determine what skills and knowledge (or traits and abilities) that industry desires with the intent that academia can determine what courses are needed to offer those capabilities. Either line of questioning offers useful information to those designing requirements for an aviation major and the various syllabi for the included classes.

In 1987, Fairbain encouraged a "…broad based organized effort to identify appropriate content for aviation management courses" (p. 2). He added that, "The University Aviation Association (UAA) seems to be the most logical choice to organize efforts aimed to this direction" (p. 22).

In 1995, Kaps and Widick surveyed airport managers to rank 26 courses for students seeking a career in airport management. Comparison was made among 1976 UAA curriculum guidelines, a 1989 study of Illinois airport managers and their study. Neither study of airport managers supported the UAA guidelines. The two studies found that the ten most valuable courses are: (1) financial management, (2) airport operations/management, (3) aviation regulations, (4) introduction to management, (5) airport planning, (6) personnel management, (7) speech and (8) technical writing (Kaps & Widick, 1995).

A 1997 article specifically addressed what airline presidents want in a curriculum for aviation management graduates. Courses valued by the airline executives include (1) finance, (2) law, (3) airline operations and (4) the global environment (Kaps & Ruiz, 1997). In the same year results were published indicating the *skills and knowledge* aviation consultants believed important for students in aviation related Masters of Public Administration programs (Fuller & Truitt, 1997). The emphasis of the consultants on airport planning influences the top five ranking of these *skills and knowledge* characteristics: (1) structure and operations of state/local government, (2) operations research, (3) written communication, (4) oral communication, and (5) emergency management services.

Kutz (2000) addressed the *skills and knowledge* required of those who face leadership challenges in low to mid-level positions. These are the types of positions aviation management graduates are likely to reach early in their careers. (*Early* here is used within the concept of an anticipated 40 or more year working career.) Kurtz sought input from existing aviation leaders within the State of Oklahoma. Recommended courses include: (1) communication skills, (2) decision making and critical thinking skills, (3) courses in marketing, (4) management, and (5) aspects of finance. Phillips (2004), writing from the perspective of a managerial career with a legacy airline, discusses aviation management course offerings and the apparent lack of courses in fields such as (1) marketing, (2) information technology and (3) onboard planning.

A consistent voice in the effort to identify needed *skills and knowledge* and the courses to supply those skills and knowledge is Stephen Quilty's. Quilty is perhaps continuing the work he references in H. R. Lehrer's 1985 unpublished Doctoral Dissertation entitled *A study of college level academic courses for airport management personnel* (Quilty, 2005a).

In 1996, Quilty used the term skills *and capabilitie*s (Quilty, 1996, p. 51) when

discussing cognitive learning styles of aviation students. In 2003 he received the Sorenson Best Paper Award for his article reviewing the importance of education and training for airports, both for individual employees and the organization. In that paper he discussed employee *skills, knowledge and abilities and motivation*. The importance of a needs assessment is also discussed (Quilty, 2003). He uses the requirements listed in job announcements to identify important *skills and knowledge* desired of candidates for jobs in airport management positions. He indicates that "Airport management and operations employees must…have effective team, interpersonal, communication, and decision-making skills…" and other operational knowledge and capabilities (Quilty, 2004, p. 57).

Quilty surveyed airport managers to identify key *skills and traits* desired of employees (2005a). He presents the 14 skills and values for aviation graduates identified by the Council on Aviation Accreditation (CAA) which in mid-2006 became the Aviation Accreditation Board International (AABI). He indicates the list is too broad to be of specific assistance to those planning training and education of airport managers and uses a survey which identified 28 *skills and traits*. The top eight are considered important for airport managers. They are: (1) communicate well with others, (2) know what is or is not a hazard to safety, (3) have strong work ethic and internal work standards, (4) take personal initiative, (5) be ethical, (6) manage time well, (7) plan and organize daily activities and info, and (8) think independently. The requirements for an entry-level airfield operations position at the airfield, versus terminal or landside of an airport, is the subject of another 2005 article (Quilty, 2005b). The top five most important *knowledge variables* identified are (1) ground vehicle operation, (2) self inspection, (3) lighting, (4) airport emergency plan and (5) notices to airmen (NOTAMS).

This mix of aviation management skills and knowledge does not lend itself to a concise summary. However, all comments appear to fall into three categories:

1. *Specific industry knowledge*. The preponderance of comments address specific industry related knowledge. Examples are finance, airport operations and management, emergency management services, onboard planning, ground vehicle operation, and marketing.
2. *Communication*. Communication, which includes technical writing, speaking and interpersonal communication, is mentioned in at least four studies but does not have nearly the emphasis given to industry knowledge.
3. *Personal behavior*. Behavior characteristics such as work ethic and initiative are primarily referenced in a single article.

A comment on terminology may be beneficial before proceeding. A variety of terms are used to describe what it is that industry expects of aviation management graduates. These include: *skills, knowledge, abilities, motivation, traits, and knowledge variables*. Plus, at the 2005 UAA Fall Education Conference Research Roundtable Quilty referred to the UAA Aviation Management's committee interest in curriculum issues and discussed *knowledge, skill, and ability* using the acronym *KSA* (Quilty, 2005c). Consistent use of the same terms here is not an important issue. What is important is the theme through the research that indicates academia recognizes an individual entering into the work place must not only *have knowledge* (appropriate concepts, data and skills), but be *able* to – and *desire* to – use that knowledge to help his or her new organization achieve its goals! It's like a three legged stool, take away either of three legs - knowledge, skill or ability – and the stool is of limited value.

General Business Literature

The literature discussed above points to the business nature of the field of aviation management. A review of literature describing the skills and knowledge desired for generic business students (both undergraduate business programs and Master of Business {MBA} programs) has potential to apply to the field of aviation management. To augment and validate findings from the general business literature review, personal interviews were conducted with

seven career professionals in the hiring/placement field, four are employment specialists, one selects and coordinates internships and two are director level career placement specialists. Each has a minimum of two years experience. Each of the seven represents a major organization. They were selected both because of their extensive background and by the convenience that each is involved in the job opportunity/career placement efforts on the campus where the authors reside.

A review of literature, university career web pages, and the interviews all emphasize that new-hires possess *soft-skills*. *Soft-skills* refer to "the cluster of personality traits, social graces, facility with language, personal habits, friendliness, and optimism that mark each of us" ("*Soft Skills* a Key," 2002, 2). Their importance is described by Hill (2004), "it is the *soft stuff* that differentiates the winners from the losers" among managers (p. 124).

The six key skills, described in literature and in the surveys, are described in Table 1.

The National Association of Colleges and Employers (NACE), annually publishes their *Job Outlook* report, which summarizes the results of surveys completed by hundreds of employers across the United States regarding the most desired skills in recent graduates of bachelor's programs. In their 2005 survey ("Job Outlook 2005," n.d., Figure 7), the top skills and qualities identified are: (1) communication skills, (2) honesty/integrity, (3) interpersonal skills, (4) strong work ethic, and (5) teamwork skills. These five skills are a repeat of the same five identified in the 2002 NACE survey (Coplin, 2003).

A detailed explanation of the six soft-skills is provided in the following section.

Table 1. *The Most Desired Skills/Knowledge of Recent Graduates of Business Programs*

	Skill/Knowledge	**Example/Illustration**
1	Communication skills	Articulates ideas clearly in writing without grammatical or spelling errors
2	Interpersonal skills	Relates well to a diverse group of people
3	Teamwork	Works well with multiple cross-functional teams
4	Leadership skills/potential	Starts projects on own and carries them out without supervision
5	Personal ethics/integrity	Does what is promised
6	Positive attitude	Shows a willingness to learn

1. *Communication skills*. In four surveys conducted between 2002 and 2005 (Alsop, 2004; Alsop, n.d.; Coplin, 2003, p. 3; "Job Outlook 2005," n.d., Figure 7), employers cited skillfulness in communication as the most important characteristic sought in recent graduates. This includes the gamut of communication abilities—verbal, written, and non-verbal skills. Recruiters look for graduates who articulate ideas clearly and concisely, orally and in writing (J. Fernandez, personal communication, March 22, 2005). Writing ability includes producing reports, memos, and e-mails without grammatical errors or spelling mistakes (Dillon, 2004). Ideal candidates know when to use "standard forms and in what tone to use them" ("*Soft Skills* a Key," 2002, 11).

Recruiters and managers state that ideal job candidates should be comfortable when presenting information in formal settings, and often times more importantly, in informal, impromptu situations. This includes the ability to give a "quick synopsis" of an issue "in a moment's notice" (D. Margolis, personal

communication, February 28, 2005). Employers also look for those who effectively communicate "in diverse settings, with a diverse group of people" (C. Jenkins, personal communication, March 7, 2005). Listening skills are also important. Holton (1998) states, "experienced subordinates learn to listen attentively to their boss and are more effective because they are able to respond precisely to questions or requests" (p. 167).

2. *Interpersonal Skills*. Another area receiving much importance as a hiring criterion is interpersonal skills (often referred to as "people skills"). Alsop (2004), reporting in *The Wall Street Journal*, describes a survey in which recruiters rated 20 attributes of students and their respective business schools in terms of the characteristics most desired in students transitioning to the workforce. The top attribute is a combination of communication and interpersonal skills. This demonstrates that these skills are linked, but the line between them is often blurry—one cannot have strong interpersonal skills without also possessing strong communication skills. Other studies also place interpersonal skills as one of the top attributes sought by companies in recent graduates (Alsop, n.d.; Coplin, 2004; Coplin, 2003; "Job Outlook 2005," n.d.).

Businesses are complex organizations. Add the human element and this complexity grows exponentially. For this reason, employers want to hire those with strong interpersonal skills. Interpersonal skills are described as the "capacity individuals possess of relating to others" (Vernon, 2002, p. 156). In a job description for the position of an entry-level administrative assistant at an aviation consulting firm, the competency expectation for interpersonal savvy is described as:

> Relates well to all kinds of people, up, down, and sideways, inside and outside the organization; builds appropriate rapport; builds constructive and effective relationships; uses diplomacy and tact; can defuse even high-tension situations comfortably (M. Wilkins, personal communication, July 27, 2005).

Individuals with good interpersonal skills have the ability to "read" people and act accordingly. Employers value recent graduates with sharp interpersonal skills because they provide for a positive, efficient, and effective work environment (Coplin, 2003). And if disagreements do arise between individuals at the workplace, which invariably happens, employees with excellent people skills will overcome differences without offending or alienating their colleagues.

3. *Teamwork*. Next, since "good teamwork is the law of most high-functioning organizations" (Coplin, 2003, p. 57), employers covet recent graduates who have honed their teamwork skills (Alsop, 2004; Coplin, 2003; Job Outlook 2005, n.d.; J. Fernandez, personal communication, March 22, 2005; J. Ott, personal communication, March 31, 2005). Having good teamwork skills means communicating ideas effectively, sharing knowledge, and providing motivation and support to teammates. Coplin (2003) adds, "Perhaps the most important skill set you need for teamwork is patience and tolerance for the process" (p. 56). Recruiters want their new-hires to work effectively not only with a single team, but also simultaneously with multiple, cross-functional teams (D. Margolis, personal communication, February 28, 2005). And just as communication skills are closely related to interpersonal skills, so too are teamwork skills directly tied to both interpersonal and communication skills.

4. *Leadership*. Recruiters state that ideal job candidates have leadership skills—or, at the very least, exhibit leadership potential. *Leadership skills* is cited as a top quality desired in recent graduates in various studies surveying recruiters and managers (Alsop, n.d.; Alsop, 2004; Coplin, 2003, p. 3). For some recruiters, leadership is the *most* desired skill (J. Fernandez, personal communication, March 22, 2005). New-hires with strong leadership skills are not afraid to take on challenges and see them through their completion (C. Jenkins, personal communication, March 7, 2005). Recruiters want new-hires to take the initiative to start projects when they see a need to do so (C. Jenkins, personal communication, March 7, 2005). Having leadership skills also translates to

remaining actively involved in projects and the company on the whole (J. Fernandez, personal communication, March 22, 2005).

5. *Ethics*. Being ethical and possessing integrity are personal characteristics repeatedly mentioned by recruiters as key hiring criteria (Alsop, 2004; Coplin, 2003; "Job Outlook 2005," n.d.). The recent scandals that have shaken corporate America place ethics in the spotlight, especially in MBA curricula (Alsop, n.d.). Recruiters look for new-hires who are "honest in their dealings with co-workers and clients and who take responsibility for their actions" (Coplin, p. 13). In this category, ideal job candidates "do what they say they will do" (C. Jenkins, personal communication, March 7, 2005).

6. *Attitude*. Recruiters and managers desire graduates who have a positive attitude (D. Margolis, personal communication, February 28, 2005; J. Madsen, personnel communication, March 22, 2005). Again, this is a personal quality more than a skill, but it is an important hiring criterion nonetheless. Employers like recent graduates with an "I can do it" mentality or a "get-it-done" attitude, where they are willing to jump right into a project with an open mind and an eagerness to learn. As Holton (1998) stated, most managers are willing to give opportunities to new employees who demonstrate that they have the right attitude and are willing to work extra hard. It is effort and dedication to working hard that stand out to managers and earns you their respect early on (p. 44).

To recruiters, involvement in volunteer activities reflects a positive attitude, since it shows the candidate takes the initiative to do something on their own (D. Margolis, personal communication, February 28, 2005). On the other hand, new-hires with poor attitudes might "watch the clock" or weigh "their effort against what they're paid" (Holton, p. 45).

To summarize, the skills and knowledge recruiters and managers most desire in recent graduates are six soft-skills; the "best" job candidate possesses a variety of these skills. Absent from this discussion is the expectation of specific functional knowledge and skills. It seems reasonable that industry expects an accounting major from a business school to possess basic desired knowledge of accounting concepts and regulation and the skills to perform basic functions such as auditing. The absence of comments to the contrary makes this type of assumption logical. Students must realize that they not only need expertise in *soft skills*, but also in their specific functional field.

RESEARCH METHODOLOGY

The research instrument was designed to gather feedback on the strengths and weaknesses of recent aviation management graduates as perceived by aviation industry advisory board members. The advisory boards are designed to provide feedback to academic departments regarding timely industry processes and how best to prepare students to negotiate industry challenges. Membership typically includes representatives in aviation management positions, as well as members who are primarily associated with piloting or aircraft maintenance. Instead of determining which universities had such boards, the authors contacted the chairperson of all UAA institutional members and asked the chairperson to request their advisory board members "or other alumni" to participate in the survey. Multiple attempts were made to contact and encourage UAA institutional members to participate in the study. One-hundred seventy responses representing 33 UAA member institutions were collected.

UAA Aviation Management Committee members and SIUC Aviation Industry Advisory Committee members provided input and suggestions that led to the development of the research instrument which was an on-line survey composed of eight questions. The instrument was also approved for use by the SIUC Human Subjects Committee. The first five questions were developed to collect respondent demographic data. The last three questions were open-ended, and asked respondents to remark on the observed strengths and weaknesses of recent aviation management graduates.

All narrative comments were reviewed and categorized by central theme. Four prevailing categories emerged from the analysis, a) business knowledge and experience b) personal behavior c) computer and technical skills d) communication and interpersonal skills. Several

comments were not used because of vagueness, or the statement appeared contradictory to the category. General comments were analyzed to identify words such as *more* (i.e. “students need more”) which indicated a weakness, and *impressed* (i.e. “I’ve been impressed”) which was interpreted to indicate a strength. Similar comments were included in the tally of strengths or weaknesses. The number of responses associated with each category is shown in Table 2.

DISCUSSION

The review of literature indicates that previous research has focused on identifying what subject matter and skill/knowledge sets are considered most desirable by different segments of industry. Aviation related literature reveals that job skill and knowledge are characteristics most highly regarded in new entrants to industry. In contrast, the business literature appears to place greater value on the possession of *soft skills*, i.e. communication skills, interpersonal skills and teamwork skills, in recent graduates.

This study sought to identify the strengths and weaknesses that members of the aviation industry have observed in recent graduates. One hundred seventy-one respondents provided 170 usable comments. 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.

Business Knowledge and Experience

Respondents identified *business knowledge and experience* as a recent graduate's greatest strength (33 comments) and greatest weakness (56 comments). Fifty-two percent of the collected responses were related to this theme. The following statements are typical of the comments received.

Strengths

1) [Graduates have an] "Overall knowledge of aviation in general and specific knowledge of current issues in the aviation community."

2) [Graduates have a] "Basic familiarity with industry situations and trends. This helps to define the context of our business strategy and helps the new employee understand what is important about his/her work for the organization."

3) "Their aviation knowledge is excellent. This is their greatest strength."

Weaknesses

1) [Graduates lack an] "Understanding of "real world" business practices."

2) "Instead of doing hypothetical problems, have the students go to aviation businesses and work on real issues so that they can build their resumes with practical experience."

3) "Internships should be a necessity. You can tell those that have spent 4-5 months in the airline environment prior to their first official day at an airline."

Comments suggest that graduates must possess a greater knowledge of the aviation industry and its business practices. In addition, experiential learning opportunities, i.e. externships, internships, cooperatives, play a significant role in bridging the "real world" experience gap.

Personal Behavior

Respondents reported that a recent graduate's *personal behavior* is also an area of concern. This topic received 23% of the comments received. Twenty-seven of the responses were interpreted as strengths and 11 comments as weaknesses. What follows is a sampling of the comments received.

Strengths

1) "Attitude.....This is probably one of the most important factors in getting hired with a commercial airline."

2) "They seem very dedicated to succeeding in launching an aviation career, willing to put forth the necessary effort."

3) "It is a delight to work with a genuinely motivated person."

Weaknesses

1) [This] "graduate was not a self starter, was not motivated, and lacked the knowledge to work in aviation administration at almost any level."

2) "Poor attitude, poor work ethic"

3) "Lacking motivation"

Respondents indicate that technical expertise alone does not ensure success in the aviation industry. Comments suggest that personal characteristics, e.g. enthusiasm, motivation, and confidence not only aid in projecting a positive image, but also assist in promoting a productive and cooperative workplace.

Computer and Technical Skills

Computer and technical skills was the only category that did not draw a negative response. However, there were several respondents who remarked that they would like to see graduates enter the workplace with a greater knowledge of software applications. Twenty-two comments, 13% of responses received, reflected the view that a graduate's computer and technical skills were a strength. The following statements are characteristic of the responses received.

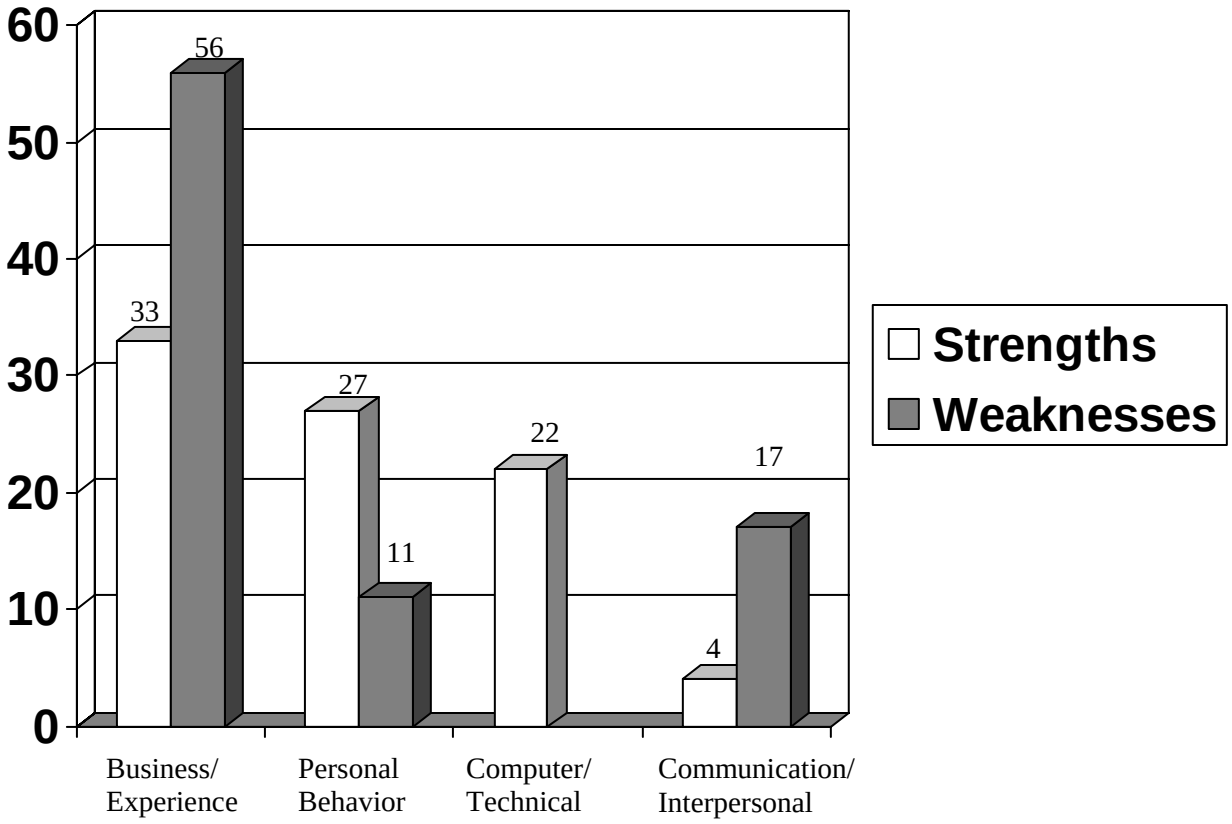
Strengths

1) "Most have strong computer skills and are fairly well versed in current events in aviation."

2) "I have found that more of our graduates have a better knowledge of technology, such as computers, than graduates of the past."

3) "They are technologically savvy."

Table 2. *Summary of Strengths and Weaknesses Reported By Industry*



Respondents report that recent graduates are proficient in computer related activities and associated technologies. The following statement eloquently captures the perception that many respondents communicated in their comments. "One strength common to all recent graduates is their ability to accept new technology and learn its functions. They not only accept technology - but embrace it."

Communication and Interpersonal Skills

Twenty-one respondents (12%) indicate that a recent graduate's *Communication and Interpersonal Skills* are areas that warrant increased attention. Four of the responses were cataloged as strengths and 17 were categorized as weaknesses. The following is a sampling of the comments received.

Strengths

1) "All around strong in interpersonal skills. The graduates I've been involved with carry themselves well, are well versed professionals, who can carry on intelligent conversations with fortune 500 CEO's one minute and can rub elbows with blue collar guys at a biker bar the next."

2) "They are strong in technical skills and have good communication (written and oral) skills along with a desire to learn and advance quickly."

3) "The strengths that I have observed include superior skills in written and verbal communications, math, and superior skills in other technical applications."

Weaknesses

1) "The weaknesses I've found have been in people skills - interacting with fellow employees - teamwork."

2) "Overall written communication skills needed work to prepare written reports and other communications efforts for writing documents."

3) "Aviation graduates need to improve their written communications skills. Written English (even in the form of an email) is still the prime method of conveying ideas and an individual who cannot construct a simple sentence or spell correctly quickly loses credibility."

Respondents indicated that recent graduates are lacking basic communication skills and do not interact well with fellow employees. Writing intensive programs, e.g. "Writing Across the Curriculum", are methods of addressing basic writing deficiencies before students enter the workplace. Oral communication exercises, e.g. oral presentations and other public speaking activities would assist in offsetting the oral communication shortcomings noted by respondents.

Emphasizing the need for teamwork and cooperation in the workplace, as a component of curriculum, would assist graduates in transitioning to that arena with greater ease. In addition, experiential learning activities would allow students the opportunity to observe and practice interpersonal skills as members of the workforce.

CONCLUSION

Self-Critique

Some readers may see limitations of this study due to the number of respondents. One hundred seventy voices do not represent the millions who work in the aviation industry. The 33 schools represented are less than half of the UAA member institutions approached for comment. In addition, the results are general and do not permit a specific institution to know how its graduates are doing, i.e. are their graduates receiving praise for their strengths or criticism for weaknesses? Some may determine that these characteristics make the study of questionable value.

A contrary view is that the responses represent all geographic areas of the country and all major functional areas of aviation (airports, airlines, etc.), and that the comments fall into a clear pattern. There were no unusual issues mentioned which did not fit into one of the four categories. This meets the validity test for naturalistic inquiry (Lincoln & Guba, 1985). A faculty member or department can use this data in decision making regarding course content and teaching approach plus respond to the emphasis given to internships and other on-the-job exposure opportunities.

At the minimum, the data may support existing decisions and actions. In addition, for perhaps the first time, academia has patterned comment about the strengths and weaknesses of

graduates. In sum, the study has value. Which view prevails is left to the reader.

How Are We Doing?

The "we" in this question is academia, those individuals who produce and graduate aviation management majors. Based on this survey, aviation education institutions would be advised to examine the course content of their curricula, and modify as necessary, to reflect the expectations of industry. We must do a better job of preparing graduates for their transition to the workforce by emphasizing industry knowledge and communication skills.

We must also provide experiential learning opportunities for student to ease their transition to the workforce. It would be presumptuous to assume that a graduate's personal characteristics (i.e. work ethic, attitude, etc.) are solely influenced by a post-secondary aviation education. However, as educators, we have a responsibility to advise and counsel our students on the perceived importance of these personal attributes in the workplace. By doing so, we facilitate their success in the industry.

The consistent positive comments referring to a graduate's technological ability and computer proficiency are a bit perplexing. While aviation management faculty may directly or indirectly require students to be proficient in text processing, use of spreadsheets, Power Point, etc. it's not something taught as a special class (Phillips, 2004). One possibility may simply be an age gap between the alumni who did not grow-up with computers to the extent today's students have. The students know more than the old-timer and therefore the old-timer views it as a strength. The real answer is unclear. The message for current faculty is to keep demanding that students demonstrate these skills.

An unstated message must be considered. Among the hundreds of individual comments analyzed in this study not one indicated that academia was failing, "missing the boat," "didn't have a clue," or other such statements that indicated failure. We choose to believe that this means all-in-all, academia is generally working in the right direction to provide graduates with adequate skills and knowledge. But, we can and need to do better.

Future Research

There are many options for future study. Two practical possibilities include:

1. Conduct a strength and weakness study for graduates within two aspects of industry, for example just the airline management and airport operations management. Compare and contrast the results.
2. Collaborating with faculty members from two or more institutions, complete a strengths and weakness study for graduates from each institution and compare the results.

We (the authors) hope that one or more of the readers consider these ideas or others and accept the challenge to further this line of research. Without such "real world" feedback, academia is only guessing on the quality and or success of our efforts. We look forward to benefiting from your future efforts.

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Distance Learning in Collegiate Aviation: Meeting the Needs of Airport Professionals

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ABSTRACT

Distance learning, referring to those courses which can be completed via the computer and internet and 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 the American Association of Airport Executives 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. *As we move to meet the educational needs of working adults in a mobile society, our conception of the university must extend beyond place and embrace process. 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)

INTRODUCTION

In the past, studies completed outside the traditional classroom environment were referred to as correspondence courses, extension courses, extended studies, external studies, home study, and continuing education ("Historical timeline," n.d.). More recently, with the assistance of integrative learning technologies, this realm of education is being referred to as e-learning, distance education, online learning, web-based instruction, and distance learning (Carr-Chellman & Duchastel, 2000; Jung, 2001; Romi, 2000). It includes instruction in both synchronous and asynchronous learning environments, and utilizes any number of technologies, such as audio or computer conferencing, computer-mediated instruction, internet-based instruction, videocassettes or disks, or television. As Garrison (in Jeffries, n.d.) states, "distance education is 'inexorably linked to the technology.'" It is this technology, which has made distance learning so popular, that will continue to greatly expand and improve in capability and adaptability (Council for Higher Education Accreditation [CHEA], 2002).Why does a student choose to study via asynchronous, on-line learning, rather than the traditional campus-based synchronous learning? Generally, those most inclined to participate in distance learning are non-traditional students. Those working full time with personal and professional commitments, and with little flexibility to attend on-campus classes, see great benefits to distance learning. Indeed, advantages to distance learning include, (a) everyone being on an equal footing, regardless of demographic characteristics; (b) having more time to consider a response to questions posed; (c) having individualized communication, via email, with faculty; (d) remaining eligible for financial aid; (e) continuing to work full-time while pursuing a degree; and (f) the ability to pursue an education without commuting to school or arranging child care.

To be fair, the following disadvantages are recognized as well: (a) technical issues that can cause frustration, (b) fully online courses may have slightly lower success rates and higher withdrawal rates, and (c) students must be self-motivated and ready to make a commitment ("Online learning," n.d.). Disadvantages may also include inefficiency in the mode of delivery, the difficulty in establishing a learning

community, loss of personal contact among students, cheating, and obstacles with assessment (Moody, 2004).

Although today's technology plays a large part in making distance education so popular, it is not without drawbacks. Some institutions point to difficulties in establishing the necessary technical support and training. Others become frustrated with the speed of technological innovation, arguing that it is difficult to invest considerable resources into a program that could soon become based on "old" technology. Additionally, not all curricula are found to be suitable for distance learning (Scarpellini & Bowen, 2001). Regardless, institutions are finding solutions to these problems and creating on-line offerings at a record pace.

METHODOLOGY

Purpose

The purpose of this research effort was to gauge not only the interest in, but also the demand for, collegiate aviation distance learning programs among airport professionals. By focusing on this sector of the aviation industry, potential and current non-traditional collegiate aviation students were able to express their opinions about the role of distance learning in their continuing education needs. This study was considered important for those institutions currently offering aviation distance learning options, as well as those aviation programs considering offering such courses. Specifically, what demand, if any, exists among airport professionals for aviation courses either currently or potentially being offered via distance learning by various institutions?

Participants

As the target population for this study was airport professionals, the *2005 American Association of Airport Executives Membership Directory and Yellow Pages of Corporate Members* was utilized to select a random sample of 200 potential participants (American Association of Airport Executives [AAAE], 2005). Utilizing the 2005 AAAE Membership Directory, the names of all 3,739 non-student members included in the directory were consecutively numbered by hand. A random numbers table was then utilized to arrive at 200 randomly selected numbers to allow the study sample to be selected. Only those AAAE members currently employed at an airport, in any capacity, were selected for this study. If the name of a retiree or college professor was selected, for example, this name was not included in the sample and an additional random number was selected to arrive at a complete sample of 200.

Survey Instrument

As this research effort was designed to solicit opinions regarding distance learning, a decision was made to utilize an on-line survey tool to conduct the survey. SurveyMonkey.com is one of several websites specifically designed to host surveys, collect responses, and compile the results. An original, researcher-created questionnaire, entitled Aviation Distance Learning Survey, was created on Survey Monkey for this research effort. Following the advice of Dillman (2000), typically objectionable questions (such as age, gender, and years of experience) were placed near the end of the survey, while the questionnaire began with an easy to answer question asking respondents to check those adjectives that described their perception of academic courses offered via distance learning. This questionnaire was first pre-tested on five individuals currently working in the airport industry, as well as five individuals working in other fields. Comments received allowed for refinement of the questionnaire and an accurate understanding of the time necessary to complete the questionnaire.

Procedure

This study, which was conducted from November 2005 to January 2006, began with an email invitation to the 200 individuals on November 29, 2005. Included in the email was an electronic link to the on-line survey. The email introduced the survey and the importance of the research effort. It likewise proposed that less than five minutes were usually necessary to complete the survey, and explained both the voluntary participation and confidentiality of responses ensured by the researcher. Additionally, per Survey Monkey policy, a link was included to allow individuals the opportunity to decline participation in the survey

and discourage future follow-up by the researcher.

A total of 39 emails were returned as undeliverable, thus requiring the selection of 39 additional names with the use of the random numbers table. Emails to these 39 respondents were sent on November 30 and December 1, 2005. The initial email invitation garnered a 26 percent response rate, with 51 responses being received. Based on Dillman's (2000, p. 149) advice that "multiple contacts have been shown to be more effective than any other technique for increasing response to surveys," a reminder email was sent on December 12, 2005, to all non-respondents. By January 1, 2006, 69 responses had been received, for a 34.5 percent response rate. Due to the lower than desired response rate and the realization that some respondents may not have internet access or be familiar or comfortable with responding to an on-line survey, it was decided to implement a mixed mode design. Although most people have previous experience with the typical paper and pencil questionnaire, the same cannot be said for people asked to respond to electronic surveys (Dillman, 2000). Indeed, Dillman (2000, p. 240) explains that "evidence exists that people prefer certain modes, and if such preferences are significant it stands to reason that people who have not responded to one mode because they dislike it may be receptive to a change in approach." Additionally, he explains that by switching modes, the importance of the study is emphasized to non-respondents.

The implementation of the mixed mode design required converting the on-line survey to a paper format. A replacement questionnaire was sent via fax and introduced by a personal memorandum on January 7, 8, and 9, 2006, to 125 non-respondents. Six had declined participation in the survey via the aforementioned link and thus were not subjected to any follow-up. This mixed mode effort, designed to increase the survey response rate, was successful in achieving that goal. Twenty-two additional surveys were received either via mail or fax, while an additional 13 individuals chose to complete the on-line version. The final response rate for this mixed mode design with multiple contacts was 52 percent, with a total of 104 surveys being returned and considered usable.

Limitations

Although other techniques may have been adopted during survey implementation to further increase the 50 percent response rate, limited resources prevented the implementation of a telephone follow-up, financial incentive, or certified mail follow-up, for example. Additionally, it is recognized that those 39 individuals with invalid email addresses initially selected for the study were excluded from the study as a result. Although the possibility exists for invalid fax numbers or postal addresses in these survey modes, it appears the likelihood is less. The exclusion of these 39 individuals from the study could have been prevented by sending paper questionnaires via postal mail to those with invalid email addresses. Based on the experience of conducting this survey project, if the researcher wishes to include all participants initially selected in the sample, a mixed mode survey should be adopted to account for those with invalid email addresses, as well as those without internet access or those hesitant to complete an on-line questionnaire.

RESULTS

Demographics

The age of survey respondents was fairly evenly distributed among the age group choices provided in the questionnaire. The category claimed by the most respondents was ages 46-55, at 30 percent of respondents. The majority of respondents (85 percent) are male, and hold, at a minimum, a bachelor's degree (86 percent). The majority of these four-year degrees are in aviation, with fields such as civil engineering, education, and accounting also listed. For the 34 individuals with a bachelor's degree and volunteering the name of their alma mater, Embry-Riddle Aeronautical University was listed most frequently (by 11 respondents), while Southern Illinois University and Purdue University were mentioned by 4 and 3 respondents, respectively. Additionally, almost half (48 percent) of respondents possess a master's degree. Forty-one percent of these degrees are in business, with fields such as

aviation and public administration also listed. Two individuals also possess a doctoral degree.

When each respondent was asked about the extent of their experience in the aviation industry, 60 percent stated they have more than 15 years. When questioned about specific experience in airports, only 38 percent stated they have more than 15 years. Most respondents were in management, with 21 percent holding executive management positions, 35 percent holding director or senior director positions, and 29 percent holding mid- or low-level management positions. Also of significance is the number of respondents who are Accredited Airport Executives (A.A.E.) through AAAE. Only 14 percent indicated they were an A.A.E. This is almost identical to the number of active Accredited Airport Executives as noted in a survey of 200 airport managers by Prather (1998). Lastly, 63 percent of respondents have never completed a distance learning course. However, 30 percent have completed between one and five distance learning courses, with six respondents having completed more than five.

Descriptive Words

The first item on the questionnaire simply asked respondents to check all adjectives that described their perception of academic courses offered entirely via distance learning. This item was chosen based on Dillman's (2000) advice that the first item should apply to all respondents, be easy to complete, and be interesting. Those adjectives selected by more than 50 percent of respondents include affordable, convenient, and flexible. Those adjectives selected by less than 10 percent of respondents include difficult, high quality (in contrast to choices of reasonable quality and poor quality), and inconvenient (see Table 1).

Table 1
Evaluation of Adjectives Describing Perception of Distance Learning Courses

Words	Agree	Disagree
Affordable	52	48
Boring	10	90
Challenging	20	80
Convenient	80	20
Difficult	9	91
Dynamic	9	91
Expensive	15	85
Flexible	70	30
High quality	7	93
Reasonable quality	48	52
Poor quality	9	91
Impersonal	47	53
Inconvenient	3	97

Note 1: Numbers represent percentages (N=104 for all cases).
Note 2: Shaded category represents the one adjective to which the most respondents agreed.
Note 3: Words are listed in alphabetical order as they appeared on the questionnaire.

Perceptions on Distance Learning

The questionnaire next sought respondents' opinions regarding the quality and convenience of courses offered via distance learning. Specifically compared to traditional, on-campus courses, fully 52 percent of respondents felt the quality of distance learning courses was about the same. A combined 43 percent of respondents expressed concern, however, about the inferior quality of distance learning. As could be expected, 84 percent of responding airport professionals agreed that the convenience of distance learning is superior to that of traditional, on-campus courses (see Figures 1 and 2).

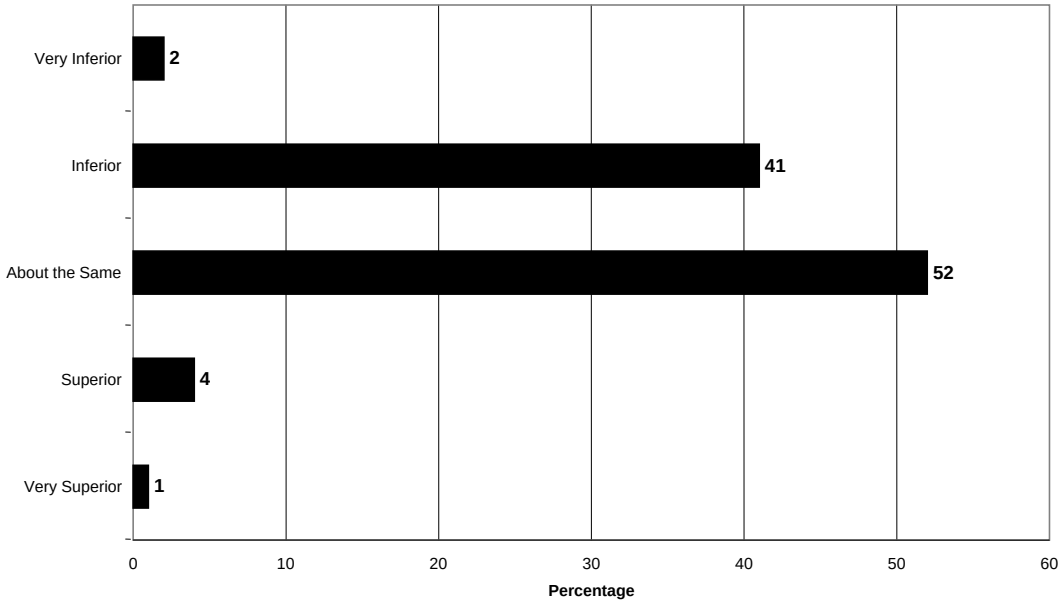

Figure 1. Compared to traditional, on-campus academic courses, the quality of distance learning courses is...

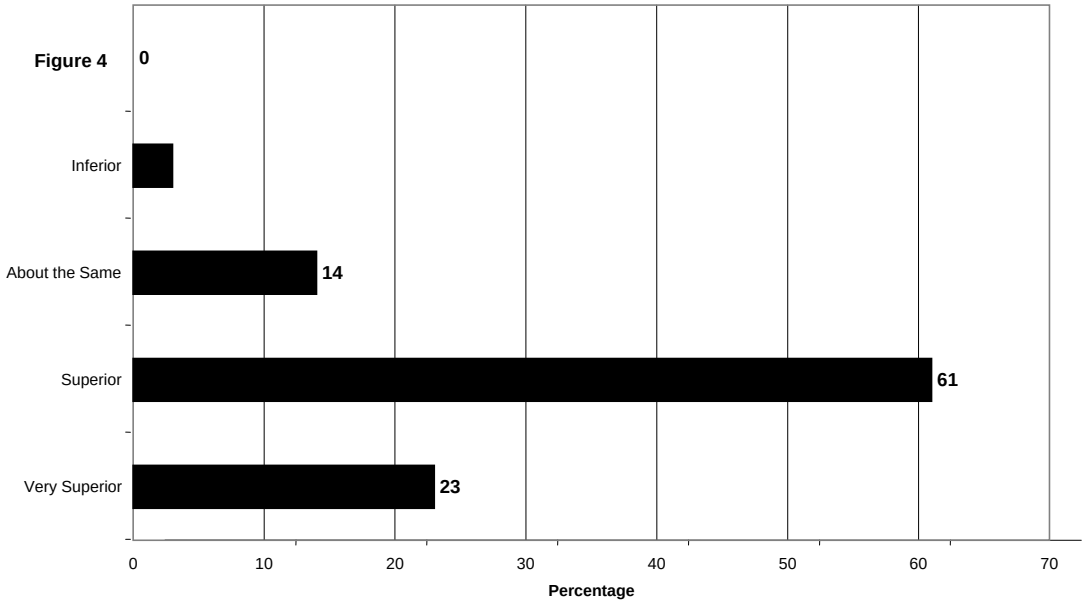

Figure 2. Compared to traditional, on-campus academic courses, the convenience of distance learning courses is...

The questionnaire also contained 13 statements utilizing Likert-type scales, which were designed to seek opinions regarding certain aspects of distance learning. First, respondents were asked to indicate their agreement with the following statement: "I believe in the importance of continuing education." Almost 100 percent of respondents agreed with this statement (see Figure 3).

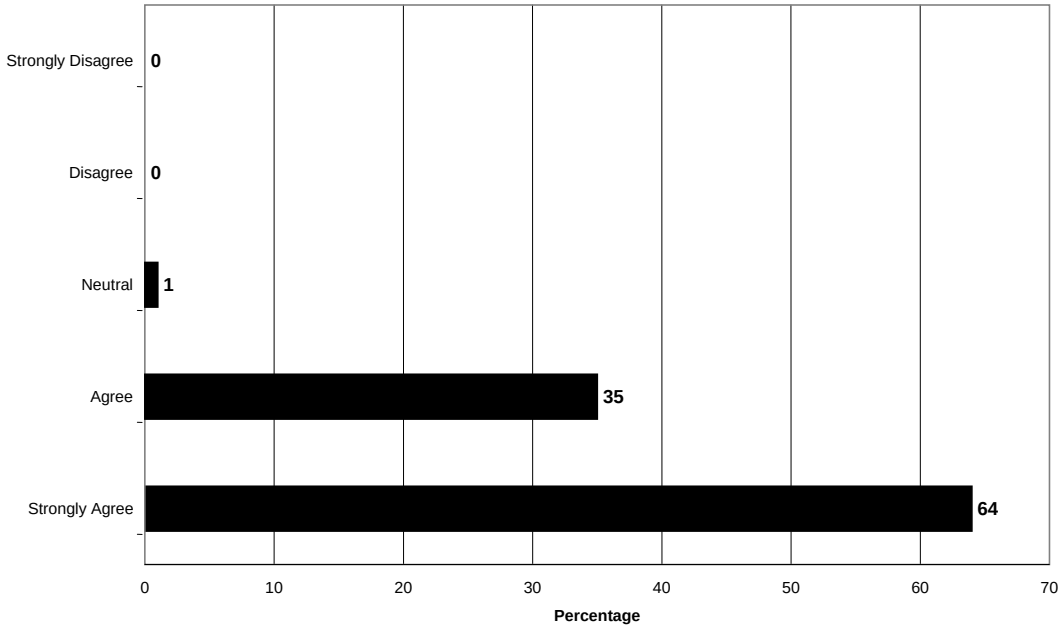

Figure 3. I believe in the importance of continuing education.

In an attempt to better gauge the demand for higher education among airport professionals, the next question inquired about the desire to obtain either a first or additional academic degree in aviation. Fully 43 percent of respondents agreed they would indeed like to pursue such a degree (see Figure 4). However, respondents also indicated that various hurdles, such as expense (20 percent), no programs available (12 percent), professional commitments (39 percent), and personal commitments (38 percent), interfere with this pursuit.

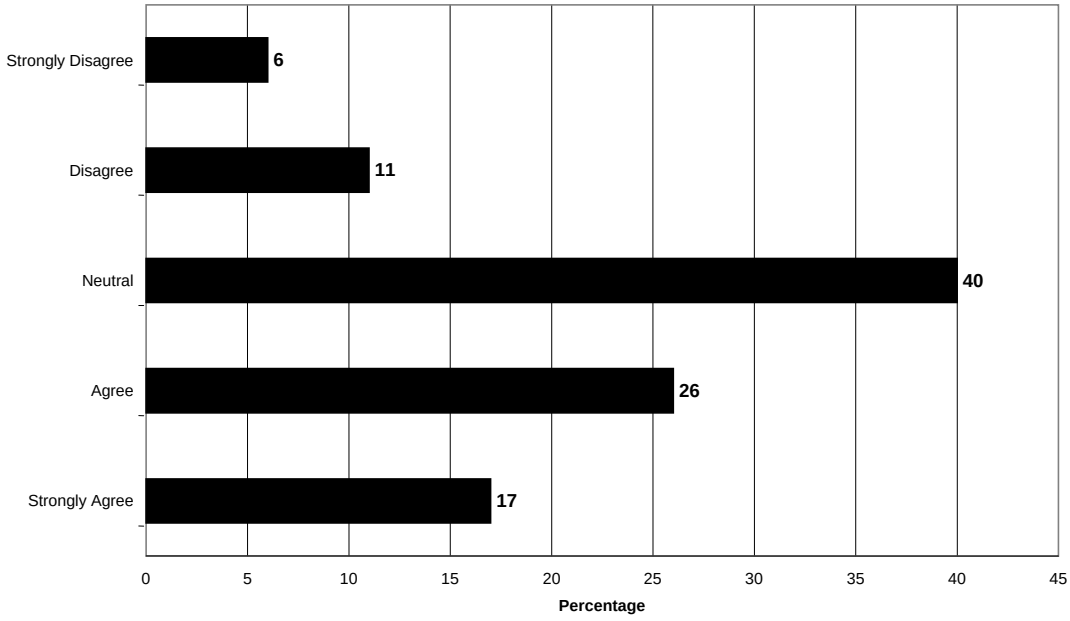

Figure 4. I would like to obtain either a first or additional academic degree in aviation.

An objective of the survey was also to understand the extent to which airport professionals are aware of current aviation distance learning offerings. For instance, would more airport professionals enroll in aviation distance learning courses if they simply knew they existed? Over half of respondents (56 percent) are aware of the availability of aviation academic programs that can be completed entirely on-line. However, 26 percent are neutral in their degree of awareness while 18 percent are unaware (see Figure 5).

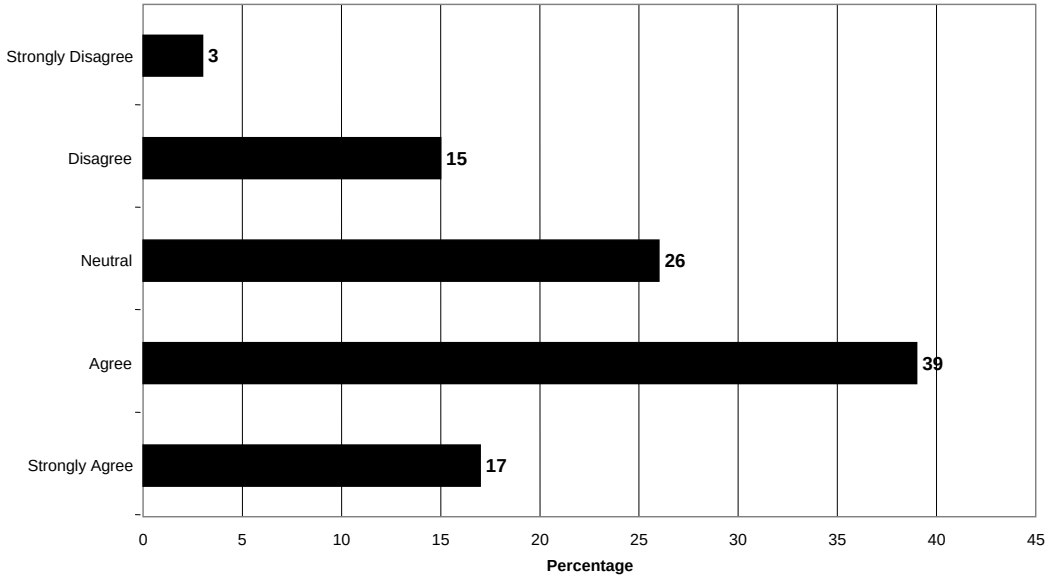

Figure 5. I am aware that some universities offer academic programs in aviation that can be completed entirely on-line.

As a follow-up to the previous question, over half of respondents (52 percent) would consider pursuing either a first or additional degree in aviation if they were able to do so at their own pace and via the Internet. Although 22 percent indicated they would not consider pursuing a degree under these terms, 27 percent were neutral, indicating they may consider pursuing an on-line aviation degree if the conditions were right (see Figure 6).

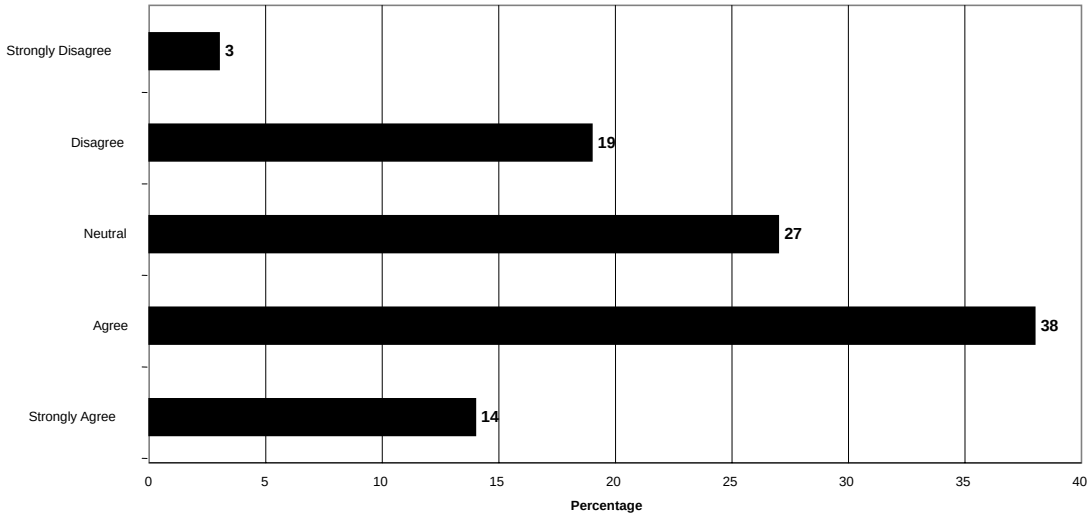

Figure 6. I would consider pursuing either a first or additional degree in aviation if I could do so at my own pace and via the Internet

Should more universities offer aviation degrees via distance learning? In essence, is the existing supply sufficient for demand? According to 57 percent of airport professionals, more universities should offer aviation degree programs via distance learning. While 11 percent disagreed with this statement, a respectable 32 percent indicated neither agreement nor disagreement (see Figure 7).

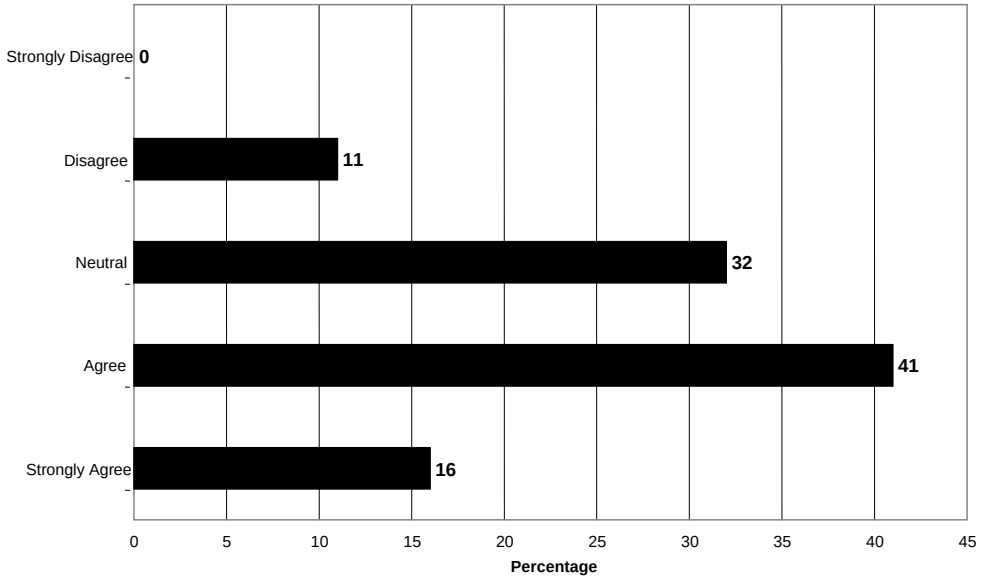

Figure 7. More universities should offer aviation degree programs via distance learning.

When considering that the majority of students engaged in distance learning programs are non-traditional students, the next questionnaire item stated, "More universities should tailor their graduate-level aviation programs to working professionals." Ninety-one percent of respondents indicated agreement with this statement. In fact, only one respondent disagreed with this statement (see Figure 8).

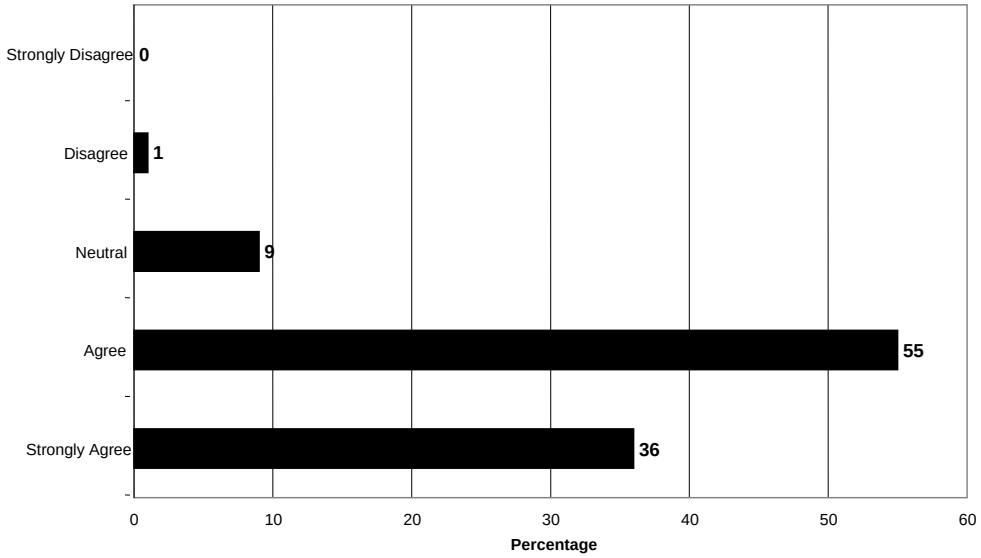

Figure 8. More universities should tailor their graduate-level aviation programs to working professionals.

In again considering the convenience of both traditional and on-line learning, respondents were asked to indicate their difficulty in attending on-campus classes and ease in completing on-line courses, based on current professional and personal commitments. Eighty-nine percent of airport professionals responding to the survey indicated it would indeed be difficult for them to attend on-campus classes. In contrast, 58 percent agreed it would be relatively easy for them to complete on-line courses, considering their professional and personal commitments (see Figures 9 and 10).

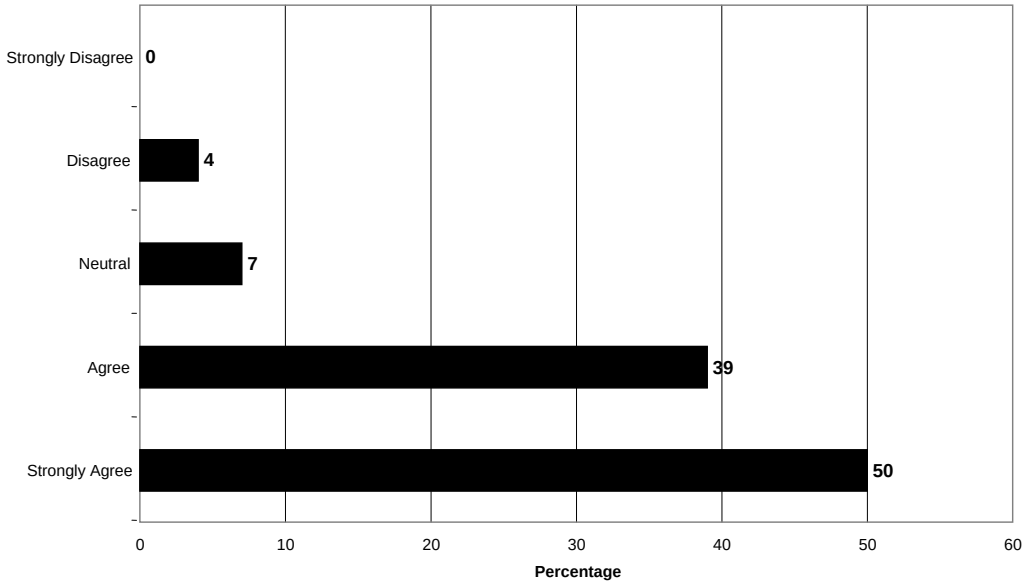

Figure 9. It would be difficult for me to attend on-campus classes considering my professional and personal commitments

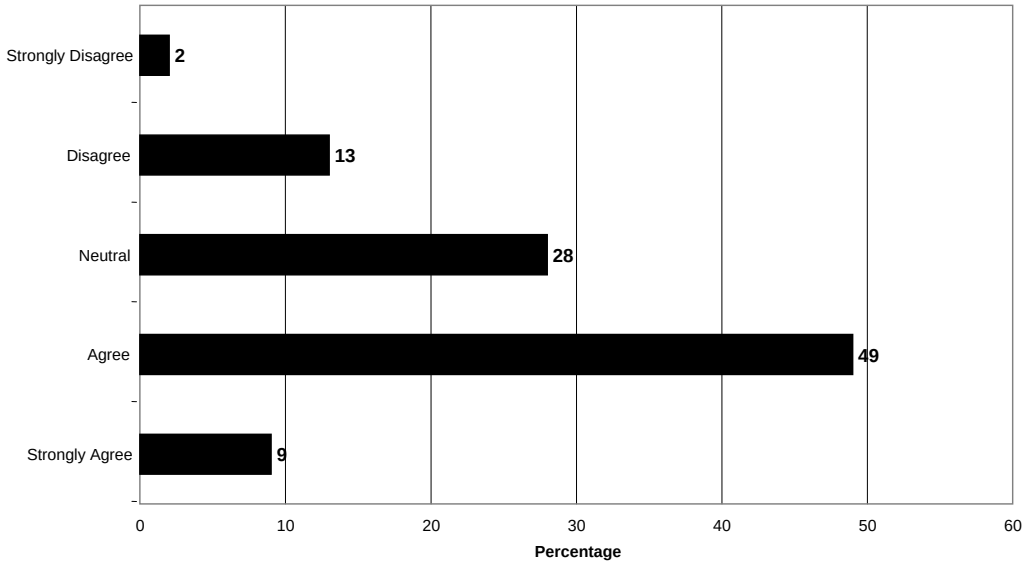

Figure 10. It would be relatively easy for me to complete on-line courses considering my professional and personal commitments

Is there great demand among airport professionals for distance learning aviation programs? Thirty-four percent of respondents feel there is. Although 56 percent neither agreed nor disagreed with this issue, only 11 percent disagreed (see Figure 11). Additionally, when asked their opinion of the percentage of airport professionals who would enroll in an aviation distance learning program if they could financially afford to do so, half of respondents (50 percent) felt that between 5 percent and 20 percent of airport professionals nationwide would do so. More specifically, 25 percent felt that 11 percent to 20 percent would enroll in aviation distance learning programs if they could financially afford to do so.

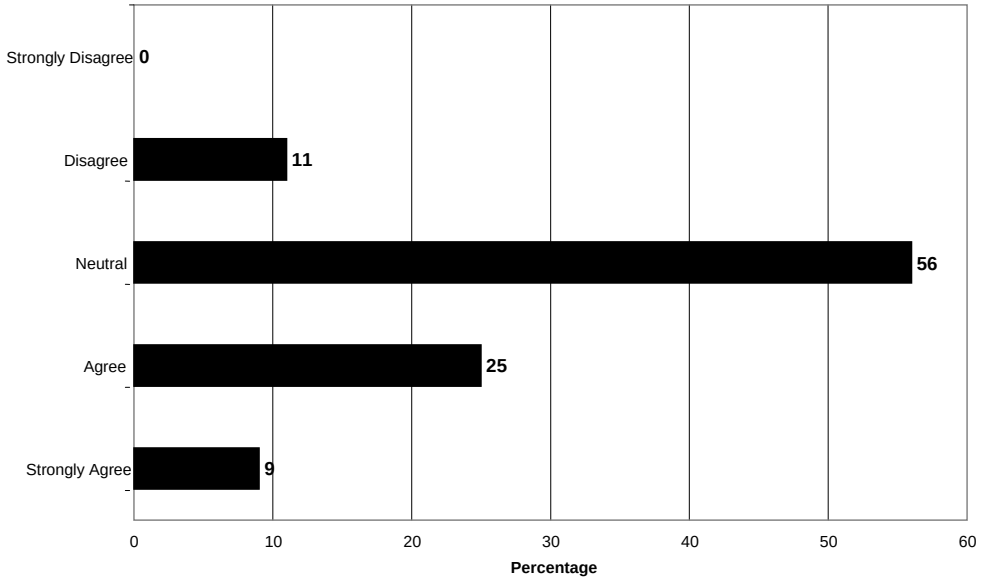

Figure 11. There is great demand among airport professionals for distance learning aviation programs.

One criticism of distance learning courses has been the lack of academic quality in the on-line environment. To determine if this was a concern among airport professionals, respondents were asked to indicate agreement with the following statement: "I am concerned about the quality of distance learning programs." Fifty-eight percent of respondents agreed with this statement. While 15 percent indicated they were not concerned about quality in the on-line learning environment, 26 percent were neutral on this issue (see Figure 12).

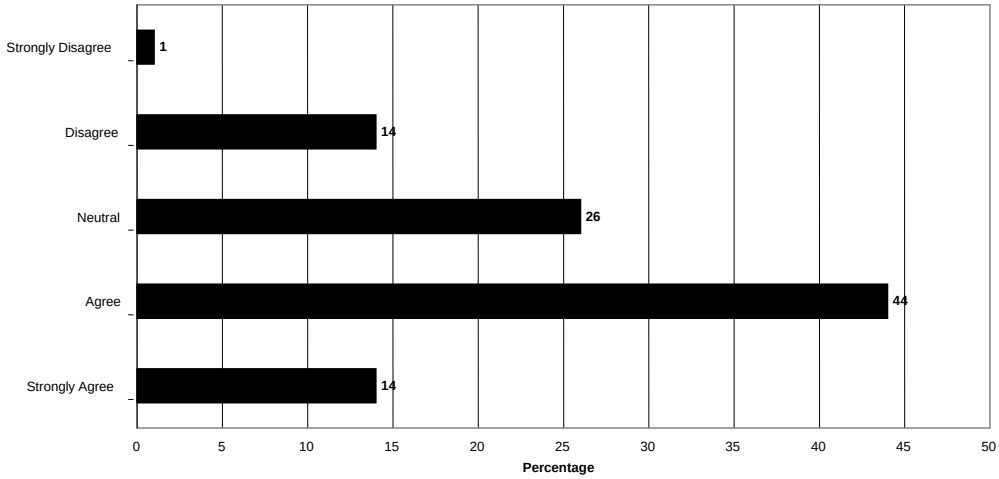

Figure 12. I am concerned about the quality of distance learning programs.

Many supporters of distance learning and the innovative technologies that make this novel form of pedagogy possible, feel distance learning is the direction education is moving. Do airport professionals agree distance learning is the wave of the future? Over half (56 percent) do indeed (see Figure 13).

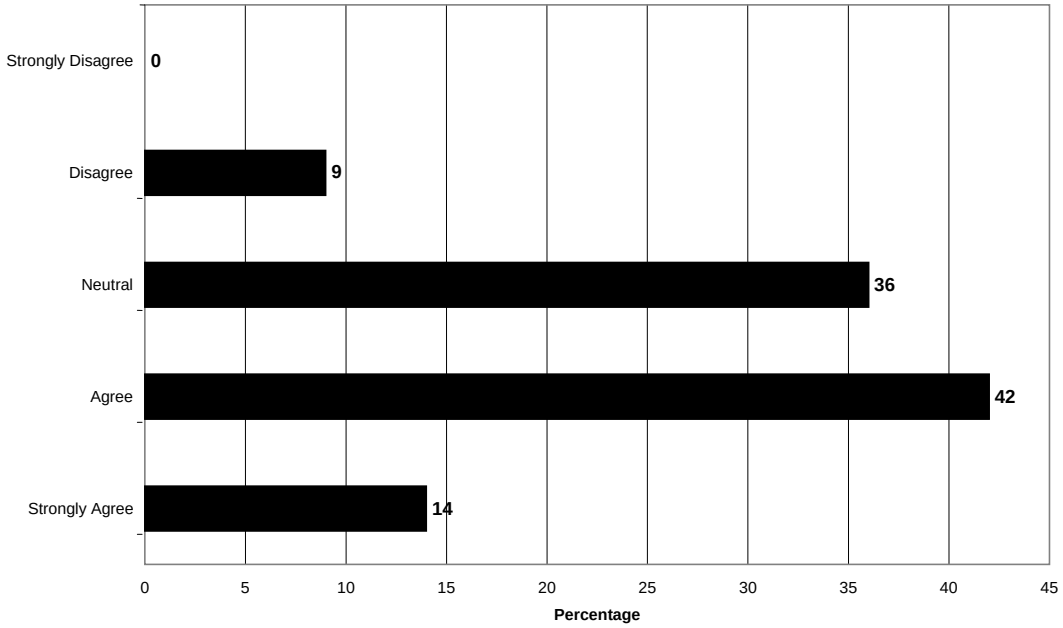

Figure 13. Distance learning is the wave of the future.

In considering the suitability of distance learning programs for non-traditional students with full time jobs, fully 79 percent of airport professionals feel distance learning programs are indeed more suitable for non-traditional students, as compared to traditional college-age students desiring to attend school full time. Only six percent disagreed with this view (see Figure 14).

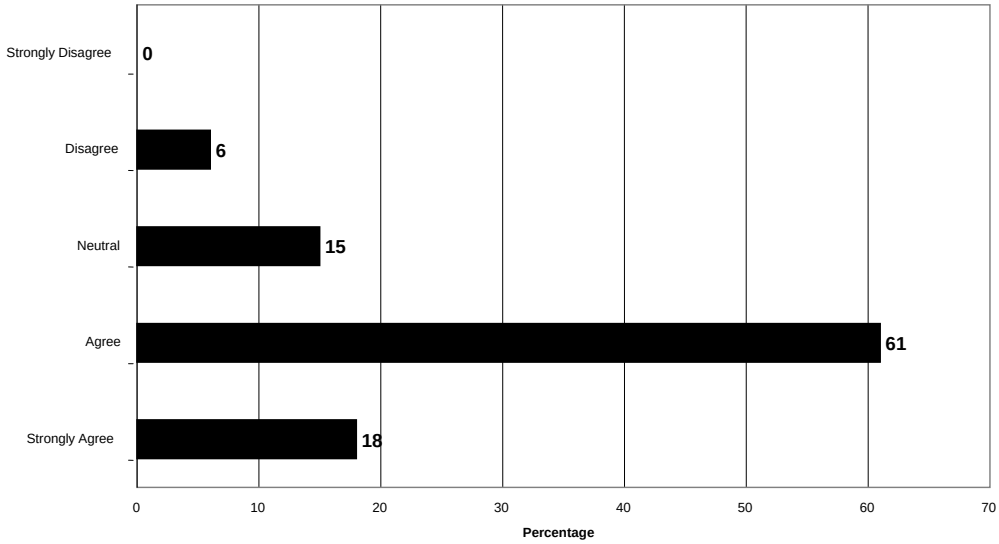

Figure 14. Distance learning programs are better suited for non-traditional students with full-time jobs, rather than traditional college-age students desiring to attend school full-time.

Lastly, respondents were presented with the following statement: "Traditional, on campus degree programs are more rigorous than distance learning programs." Although 38 percent of respondents agreed with this statement, 47 percent neither agreed nor disagreed (see Figure 15).

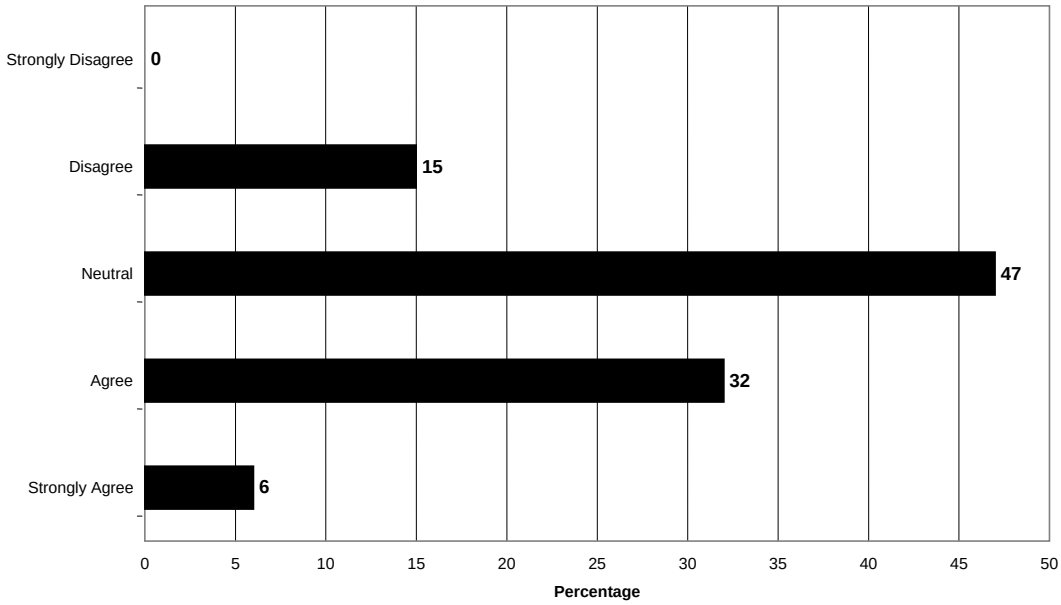

Figure 15. Traditional, on-campus degree programs are more rigorous than distance learning degree programs.

DISCUSSION

The Aviation Distance Learning Survey designed for this research project has resulted in many areas of solid data from which discussions can begin. Whether considering the quality or convenience of distance learning, the importance and awareness of distance learning, or the demand for distance learning, the airport professionals surveyed for this project were, in a sense, speaking directly to the administration and faculty of traditional collegiate aviation programs. In interpreting the thoughts and opinions expressed via the survey, important recommendations can be formulated, which should assist collegiate aviation programs in meeting the needs of airport professionals, both today and in the future.

First, we must consider the existing perceptions of quality, or lack thereof, in distance learning. Fifty-two percent of respondents feel the quality of distance learning programs is about the same as traditional, on-campus programs. Although this is admirable, we must recall that 43 percent of respondents feel the quality is inferior. Additionally, 58 percent expressed concern about the quality of distance learning programs. This should raise concern among those aviation programs currently offering distance learning courses and those considering distance learning. Although many programs utilize the same instructors, texts, and assignments in the on-line environment as the classroom setting, Metz and Bowen (in press, para. 10) explain, "too often instructors have merely transferred their standard material to electronic media without modifying to meet the needs of [a] new environment." Even so, various studies ("Frequently asked," 2005; Lehrer & Connolly, 1994; Merisotis & Phipps, 1999; Russell, 2001; Warren & Holloman, 2005) have discovered no significant difference in student outcomes in distance learning courses versus traditional courses. Regardless, potential students are still concerned about a lack of academic quality in on-line courses. One manner in which to ensure academic quality in distance learning courses is to adequately design the course on the front end.

Carr-Chellman and Duchastel (2000) present the preferred qualities or elements of the "ideal online course." Once adequately designed, more attention should be paid to educating potential students about the similarities in distance learning courses and traditional, on-campus courses, to include added emphasis in any marketing materials distributed by these programs. Additionally, as the Aviation Accreditation Board International (AABI) is the sole, formal specialized accrediting organization for collegiate aviation programs, the Technology-Based Education Committee of this organization should continue to explore the issues surrounding quality in aviation distance learning programs and the role of the AABI in ensuring that quality. As noted by Bowen et al. (2001), 84 percent of responding institutions in their study thought the organization should consider the development of academic standards for distance education programs.

A second consideration revealed in the data involves the type of individual most interested in distance learning. As previously noted (U.S. GAO, 2002), most distance learning students tend to be older and are more likely to be married. In addition, distance learning students are more likely to pursue studies part time while working full time. As Palmieri (1997, p. 4) explains, the various challenges to be encountered in offering distance learning demand you have a "good knowledge of who your learners are and what their circumstances are likely to be." In essence, collegiate aviation programs need to be aware of the target population for distance learning programs. Rather than the high school student or young person interested in the on-campus experience, collegiate aviation programs offering distance learning programs should likely focus more on graduate programs and market these programs to those already employed full time in the industry.

The survey data has shown there is an obvious interest in and demand for distance learning programs among airport professionals. Although some mentioned professional or personal commitments that may interfere with the pursuit of an aviation degree, the on-line environment is admittedly more flexible. Whether 5 percent or 20 percent of airport professionals would pursue an on-line aviation degree if they could financially afford to do so, is unclear. What is clear, however, is that many of those in the airport management profession are interested in pursuing an aviation academic degree, and they feel distance learning is the best manner in which to accomplish that objective. For this reason, one recommendation resulting from this study is for more collegiate aviation programs to consider offering courses and complete degrees via distance leaning. Distance learning is already being offered by academic departments at the majority, if not all, of the institutions housing collegiate aviation programs. Further, it appears there are existing degree programs that would lend themselves quite well to the on-line environment.

While associate and bachelor degree distance learning programs meet a need, it appears master degree programs are more suited to the on-line environment and more preferred by those most interested in distance learning -- non-traditional students with full time jobs, such as the airport professionals who participated in this survey effort. As recognized by Prather (in press), airport professionals currently can choose only from four institutions nationwide offering a total of five master degree programs in aviation that can be completed entirely on-line. Although this is admirable, the data indicates more distance learning graduate programs are needed. Specifically, 99 percent of airport professionals believe in the importance of continuing education and 43 percent would like to obtain either a first or additional academic degree in aviation. Considering 85 percent of respondents already possess a bachelor's degree, this would indicate these individuals are interested in pursuing a graduate degree. Additionally, 89 percent of respondents indicate it would be difficult for them to attend on-campus classes, yet 58 percent indicate it would be easy for them to participate in on-line courses. Finally, 26 to 44 percent of respondents are unaware that some universities offer aviation academic degrees that can be completed entirely on-line and 57 percent believe more universities should offer aviation degree programs via distance learning. This data suggests that with the right mix of marketing to airport professionals (and possibly employer financial support), collegiate aviation

programs would see increased interest in distance learning programs and as a result, would be able to meet the needs of this important segment of the aviation industry.

Various marketing tactics could be utilized by those institutions wishing to recruit airport professionals to enroll in their distance learning programs. First, institutions could have a presence at various American Association of Airport Executives (AAAE) meetings and conferences. Advertisements could be placed in AAAE's Airport Magazine. A direct mail campaign to AAAE members may also prove effective. Additionally, an aviation program may want to explore the possibility of showcasing their distance learning offerings via AAAE's Airport News and Training Network Digicast. Regardless of which strategy is adopted, increased marketing to airport professionals is important for those aviation programs wishing to increase on-line enrollment among this segment of the aviation industry.

CONCLUSION

Distance learning – the wave of the future. Are collegiate aviation programs ready to ride this wave into a more technologically advanced society? Will the continuing education needs of those employed in the aviation industry be partially fulfilled by collegiate aviation? Will concerns about the quality of distance learning programs be resolved? Although many questions remain, the data presented in this paper attempts to shed light on the demand for aviation distance learning courses and degree programs among airport professionals. Although I am not convinced traditional bricks and mortar institutions will decline in purpose or even cease to exist, I am convinced, as a result of personal experience and data collection, that distance learning programs are growing in popularity and are becoming a convenient and important mode by which those employed full-time in industry are able to enhance their knowledge levels and compete in a more technologically advanced global society.

As distance learning grows ever more pervasive and accepted in the higher education community, potential students will realize the many benefits of distance learning, resulting in increased demand. As this demand grows, collegiate aviation programs will begin seeing distance learning as simply another pedagogy that is quite useful in educating those same students who once made large sacrifices of time and effort to attend on-campus courses. Although traditional, college-age students will continue to enroll in traditional programs and enjoy the on-campus experience, for those already having done so and now employed full-time in the industry with additional personal and professional commitments, aviation distance learning programs will enable these individuals to maintain an edge in the workforce by completing an additional academic degree. As collegiate aviation rises to meet this challenge, the aviation industry will greatly benefit as a result.

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Perceived Educational Knowledge Differences Among Airport Managers and Entry-level Airport Operations Employees

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ABSTRACT

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.

INTRODUCTION

Identifying or determining the content of a particular educational course is a necessary challenge for those engaged in curriculum development. In the aviation field, flight curriculum and course content has been well developed through academic and government cooperation, study, and evaluation. Less developed is curriculum study related to aviation management and, in particular, to airport management.

While accrediting bodies such as Aviation Accreditation Board International (AABI) (formerly the Council on Aviation Accreditation (CAA)), National Association of Industrial Technology (NAIT) and American Assembly of Collegiate Schools of Business (AACSB) call for industry advisory boards to provide feedback on respective university programs about their relevancy, the boards generally are not able to provide substantive data to support aviation or airport management content and course suggestions. Instead, the industry boards generally provide anecdotal information based upon the experience and involvement of their members. Phillips (2004), writing about the difficulty in assessing or comparing courses within aviation management programs, sums it up this way: "Judgments about specific course content based on title and catalog descriptions is an inexact science (page 41)." Both Phillips (2004) and Quilty (2004) called for better delineation of the content to be taught within a particular aviation management specialization.

Attempting to address that inexact science, Quilty (2005) undertook a study that identified the knowledge and skill requirements deemed important for entry level airport operations employees. A goal of the study was to assist in the development of curricula for an airport management related program. Kaps and NewMyer (2001) had previously surveyed state aeronautic agencies about published handbooks for airport managers. They then analyzed the content of the available handbooks and compared it to industry training devices for the content covered. Kaps and NewMyer sought information on general aviation airports, while Quilty's study encompassed both general aviation and air carrier airport knowledge requirements.

This paper further contributes to the aviation and airport management field by identifying knowledge and topic areas deemed important by airport managers, supervisors, and operations personnel at various-sized airports, and it explains how such knowledge and topic areas differ from what new hires are thought to actually possess. The study results reported in this paper can be used to better identify learning outcomes as well as to delineate course content in an aviation management degree program that will better address the preparation of individuals for entry-level positions at airports.

METHODOLOGY

The survey instrument used in the study was targeted toward individuals whose job positions are related to the safe operation of an airfield, such as airfield operation, maintenance

and inspection personnel. Surveyed for this study were individuals who had responsibility for hiring or supervising airfield operations employees, and individuals employed in airfield operations positions. The study specifically targeted airfield operations rather than terminal or landside operations. Airfield operations is an area of qualification concern for the Federal Aviation Administration (FAA) in light of changes to Part 139 (Certification of Airports), 14 Code of Federal Regulations (CFR).

The survey instrument was developed by identifying 91 knowledge variables derived from Part 139; analyzing job descriptions used in Quilty's (2004) study; the CAA Accreditation Standards Manual (CAA, 2003); Flouris and Gibson's (2002) survey instrument, curricular material from various university aviation programs, and a similar knowledge list developed for the National Business Aviation Association (NBAA) Corporate Aviation Management Development Committee (Quilty, 1996). The survey was approved for use by the Human Subject Review Board at Bowling Green State University, and it was pretested among members of the American Association of Airport Executives (AAAE) Airport Training Committee.

Data were collected from large-hub, medium-hub, small-hub, non-hub and general aviation airport operators. The airport categories are identified by the FAA National Plan of Integrated Airport System (NPIAS). The hub designation relates to the number of operations and passenger enplanements an airport has during a calendar year. The 2003 NPIAS lists 31 large-hub airports, 37 medium-hub airports, 68 small-hub airports, 247 non-hub airports, and 2,961 other airports (other commercial service, reliever, general aviation) (U.S. Department of Transportation, 2004, pg. 5).

An initial electronic mailing of the survey was made in July, 2004, to 356 individuals who were identified in the 2003 membership directory of AAAE. The individuals were identified by their job titles and airport size as those likely to have direct supervision of new airfield operation hires or would have responsibility for hiring them. Of the initial mailing, 82 e-mail addresses were returned undeliverable and 274 e-mails were successfully transmitted. Two follow up e-mails requested responses in August of 2004. Receipt of surveys was stopped in late September. Of the 274 valid e-mails delivered, usable responses for this comparison study range between 100 and 106 (36.5 to 38.7 percent) because of the requirement for responses to be matched pairs from two columns. Not all respondents completed both columns.

Demographic information collected for this study allowed for determination of the respondent's position and title; whether the respondent was in a supervisory position or an entry-level position; and the size of the airport. The demographics provide a cross section of the airport organizations for 106 responses; 19 were from large-hub airports, 19 from medium-hub airports, 16 from small-hub airports, 26 from non-hub airports, and 26 from general aviation/reliever airports. However, the results of this study are reported in aggregate rather than broken into the various airport hub sizes because the nature of an entry-level position at any airport requires the same basic knowledge and skills for consideration and therefore can be combined.

Table 1. *Instructions given to survey respondents.*

In the LEFT Column, identify how important the topic is to an airfield operations person based on the numbers 1 through 6 below	In the RIGHT COLUMN, identify how prepared you feel operations new hires or applicants are using the scale A through E below.
1 - EXTREMELY IMPORTANT	A - WELL PREPARED
2 - VERY IMPORTANT	B - ADEQUATELY PREPARED
3 - SOMEWHAT IMPORTANT	C - SOMEWHAT PREPARED
4 - NOT VERY IMPORTANT	D - LESS THAN PREPARED
5 - NOT AT ALL IMPORTANT	E - NOT AT ALL PREPARED
6 - DO NOT KNOW IMPORTANCE	

The survey requested Likert-type responses in two columns. The survey asked individuals employed in airport management and operation positions in the United States their perception of those knowledge requirements deemed important for individuals employed in the field of airfield operations, or for those individuals having duties to inspect or ensure the safety of the airfield. It further asked them to rank the level of knowledge they believed new hires or recent applicants actually possessed relative to the topic areas. Participants in the study were given the instructions shown in Table 1.

RESULTS

An analysis of variance was performed for each of the 91 variables in both columns. A standard matched pair *t*-test procedure was then performed to analyze the mean of the differences (Left column minus Right column) between the two responses. Statistical analysis was accomplished by the Bowling Green State University using SAS programming. The results are reported in Appendix A.

The first column, titled "Rank," identifies the aggregate ranking of importance of the topic variable (1 is highest) as reported by Quilty (2005) in his study. The number (*n*) of valid responses used for comparison, the mean (*M*) of the differences and the standard deviation (*SD*) are identified. *T*-test values (*t*) are reported, followed by the determination of significance (*p*). The degree of significance between the means comparison is for values of $p > 0.05$. The identifier L indicates the left column is significantly greater than the right column. The identifier R indicates the right column is significantly greater than the left column. ND indicates no significant difference exists between the means of the left and right columns.

DISCUSSION

In his 2004 paper, Quilty asked. "What courses should make up the core of an aviation management program?" The Council on Aviation Accreditation (CAA) Standards Manual identifies the object of an aviation core is to ensure that all students in a collegiate aviation program have a foundation of essential and specialized knowledge of national and international aviation and aerospace systems appropriate to the degree being sought. The students' foundation of knowledge of these systems should include a broad understanding of the components of the systems, insight into how these components function together, and an understanding of how these relate to the physical, economic, political and social environments within which these systems operate (CAA, 2003, pg. 12).

The results of the current study indicate that individuals entering airport operations do not have this foundation and that a more specialized understanding of the components should be achieved. Although not all new hires will have college degrees or an aviation management background (hence, would not have been exposed to a foundation of knowledge), Quilty's review (2004) of airport operations' job descriptions identified that most position announcements required either a 4-year degree or previous aviation experience for consideration.

There are a number of factors that may skew the differences between what is required and whether new hires meet the requirements. The hiring practice, pay scale, or location of some airports may preclude consideration of well-qualified individuals, resulting in an employment pool lacking in the identified knowledge areas. Larger airports with specialized departments or higher level of responsibilities for their operations personnel may require years of experience as a prerequisite. Some of the responses may have been regionally specific thereby skewing the means (i.e., prevalence of snow operations, wildlife, etc.). Three individuals indicated no new employees had been hired during the past five years so it was difficult to assess new hires (they did not fill out the second column and hence that data was not used).

Still, the most striking aspect of the results is the general indication that airport managers and supervisors believe new hires do not have the requisite knowledge. The data indicate that of the 91 knowledge variables, new hires were less than prepared in 74 of them. Further analysis shows that those 74 knowledge variables ranked within the top 77 of those topics ranked by Quilty's 2005 study. Courses typically recognized in a management core (i.e.,

macro- and microeconomics, socioeconomics, psychology, computer science, statistics, marketing, and political science) were ranked in the lower 10 percent of the ranking, and the *t*-tests indicate that new hires were viewed as being well versed in those areas. Surprisingly, the topics of international commerce, airport history, and travel and tourism fell in this area as well, topics not normally part of a management core.

For employment in an airfield operations position, airport organizations require a more specific understanding of the components, rather than broad one, based on the reported results. To a large degree, the task of an airport operations position requires the application of knowledge. A review of texts commonly used in a university airport management courses (Quilty, 2004), aviation management courses (Prather, 2006), and the industry (Kaps & NewMyer, 2001) indicate they cover the requisite knowledge for the most part, but the actual degree of content is not fully explored in the reviews. This paper points to the need to better incorporate specific knowledge and learning outcomes in existing curriculum or to develop a new curriculum that accomplishes that goal.

Appendix B presents comments that were submitted by survey respondents and may help to clarify some of the differences found in the results. The comments contain several themes and point to problems within the industry and aviation education programs. One theme is that more operational content needs to be taught, which is supported by this study. Another theme is the expectation that a new hire in airport operations will generally require up to two years of additional training before being allowed to assume autonomous responsibilities. This theme points to the need for airports to have well-developed employee orientation or training programs. The counter to a lengthy training period is the initial personnel inefficiencies incurred and the lack of available money or resources to adequately support the training effort. A third theme mentioned in the comments is for on-the-job (OJT) training or internships. Internships are mentioned as important ways to bridge the gap between acquired knowledge and applied knowledge. However, the counter to the availability of internships is similar to that of a lengthy orientation program: inefficient use of personnel, and the lack of available money, supervision, training, or resources.

One question to be raised by the reported data is how to address the significant differences? Three primary methods are suggested to achieve the goal. One is to better educate and train individuals by revising university and college curriculum content to focus on learning outcomes that meet the needs of the industry. A second method is for airport organizations to develop and deliver better internal education and training programs. A third method is to develop and provide better external education and training programs through workshops, seminars, conferences, and other programs.

Of the three, the first method of revising curriculum content would appear to have the best overall return for the investment. More individuals would be exposed to a standard that meets the industry need and the cost of implementation will not be a burden on airports. Hiring cost to organizations would be reduced because new hires would require less internal or external training and resources. The second method, that of increased internal airport training, suffers from a concern for available financial and personnel resources (given the nature of many airport budgets), organizational structures, and airport ownership. External training and education derived from workshops, seminars, and similar outreach efforts provide a valuable service but generally require greater allocation of financial resources and suffer from infrequency or a paucity of offering.

SUMMARY

A primary goal of an academic program is to prepare an individual for his or her chosen career. Knowing what needs to be taught in a curriculum is crucial to that preparation. However, little data has existed to guide advisory groups and educators in the development of curriculum for aviation management programs, and airport management programs in particular.

This paper compares the knowledge and topic areas deemed important by individuals employed in airfield operations positions with the same knowledge and topic areas perceived to

be possessed by applicants or new hires for similar positions. The data indicate that there are variances among many important topic areas, leading to the conclusion that schools are not properly preparing individuals for airport positions. The data presented in this study can be used to identify course content and learning outcomes for a program focusing on airport management. Written comments from individuals in the field further support the need to bridge the knowledge gap.

The author presents three methods to address the gaps in knowledge: (1) revise university and college curriculum content to focus on learning outcomes that meet the needs of the industry; (2) have airport organizations develop and deliver better internal education and training programs: and (3) develop better external education and training programs through professional organizations, trainers, and outreach organizations. In this author's opinion, the most effective method for addressing the differences noted in the study is through revision of college and university curriculum.

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APPENDIX A

Matched pair *t*-tests comparing survey responses of airport manager's requirements (left column) versus perceived new hire's actual knowledge (right column).

Rank [1]	Topic	*n*	*M* [2]	*SD*	*t* [3]	*p* [4]
2	Knowledge of airport self-inspection components and techniques.	106	-1.89	1.11	-17.27	L
4	Understanding of the Airport Emergency Plan (AEP) & response capabilities.	105	-1.88	1.12	-17.24	L
3	Knowledge of airfield lighting, signs & marking requirements & maintenance.	106	-1.81	1.18	-15.70	L
7	Knowledge of Airport Certification Manual Requirements and Contents.	106	-1.79	1.21	-15.27	L
10	Knowledge of airport construction activity monitoring and practices.	105	-1.79	1.28	-14.38	L
5	Knowledge of airport condition reporting and issuance of NOTAMs.	105	-1.87	1.37	-13.93	L
1	Knowledge of ground vehicle operation and radio procedures.	106	-1.63	1.23	-13.67	L
12	Knowledge of airport security plan responsibilities under TSA Part 1542.	105	-1.70	1.29	-13.50	L
27	Knowledge of airfield construction methods and processes.	106	-1.49	1.15	-13.36	L
9	Knowledge of SIDA, access control, and identification procedures.	105	-1.64	1.26	-13.36	L
11	Knowledge of wildlife hazard mitigation problems and techniques.	105	-1.71	1.37	-12.73	L
13	Knowledge of 14 CFR Part 77 Objects Affecting Navigable Airspace.	105	-1.45	1.18	-12.52	L
17	Knowledge of Aircraft Rescue/Firefighting techniques and application.	105	-1.38	1.20	-11.75	L
18	Knowledge of fueling operations and fuel storage tanks/trucks safety.	105	-1.37	1.22	-11.53	L
22	Knowledge of FAA Form 5010.	102	-1.43	1.31	-10.98	L
14	Understanding of airport design and layout.	106	-1.36	1.30	-10.73	L
8	Understanding of acronyms, terms, common phrases used in airports.	105	-1.22	1.17	-10.69	L
21	Understanding of a Communications Center function and operation.	105	-1.23	1.20	-10.53	L
37	Knowledge of Environmental Acts, compliance and audits affecting airports.	105	-1.06	1.05	-10.27	L
26	Use of FAA Form 7460-1 Notice of Construction and/or Alteration.	105	-1.29	1.28	-10.26	L
23	Knowledge of Snow and Ice Control Plans and snow removal operations .	103	-1.46	1.44	-10.26	L
20	Knowledge of federal regulatory and enforcement process.	105	-1.15	1.21	-9.76	L
49	Understanding of project management practices.	106	-1.09	1.16	-9.72	L
32	Knowledge of air cargo security plan requirements under TSA Part 1546.	105	-1.19	1.26	-9.71	L
28	Knowledge of air carrier security plan requirements under TSA Part 1544.	105	-1.18	1.27	-9.53	L
59	Understanding of contract and lease administration.	105	-0.93	1.04	-9.19	L
42	Understanding application & use of pavement deice & anti-ice compounds.	102	-1.25	1.38	-9.10	L
16	Knowledge of air traffic control operations and procedures.	105	-1.02	1.15	-9.07	L
45	Understanding of police and law enforcement procedures.	105	-0.99	1.13	-8.98	L
39	Knowledge of 14 CFR Part 1520 Security disclosure requirements.	101	-1.25	1.40	-8.94	L

54	Knowledge of bid specifications related to equipment and other purchases.	105	-0.90	1.03	-8.93	L
40	Understanding of environmental laws and regulations.	105	-0.90	1.03	-8.93	L
44	Knowledge of OSHA regulations and insurance requirements.	105	-0.92	1.07	-8.84	L
31	Knowledge of new security technology and its application on airports.	105	-1.02	1.23	-8.47	L
24	Knowledge and understanding of Airline operations and regulations.	106	-0.92	1.11	-8.46	L
19	Knowledge of aircraft operations and regulations.	105	-0.84	1.03	-8.34	L
38	Knowledge of DOT hazardous substances, materials, markings & placards.	105	-0.94	1.18	-8.22	L
34	Knowledge of material data safety sheet information.	104	-0.97	1.23	-8.02	L
33	Understanding of public relations and information dissemination.	105	-0.87	1.11	-8.00	L
46	Understanding of noise, noise measurement & laws related to aviation noise.	105	-0.83	1.09	-7.81	L
51	Knowledge of American Disability Act (ADA) applicability to airports.	106	-0.91	1.40	-7.72	L
6	Knowledge of 14 CFR Part 139 requirements and airfield responsibilities.	106	-0.91	1.40	-7.72	L
61	Knowledge of facility maintenance methods and processes.	106	-0.83	1.12	-7.65	L
29	Knowledge of air traffic navigational equipment and operation.	105	-0.83	1.11	-7.63	L
15	Knowledge and understanding of general aviation operations & regulations.	105	-0.89	1.20	-7.59	L
25	Understanding of general supervision and management principles.	105	-0.78	1.11	-7.21	L
68	Understanding of risk management and insurance administration.	105	-0.79	1.17	-6.95	L
72	Understanding of property and real estate management.	105	-0.61	0.95	-6.61	L
36	Knowledge and understanding of Air taxi/Charter operations & regulations.	106	-0.72	1.15	-6.40	L
41	Knowledge of airport/public administration principles and practices.	104	-0.72	1.17	-6.29	L
43	Knowledge & understanding of Air Cargo/Freight operations, regs., logistics.	106	-0.71	1.17	-6.22	L
63	Understanding of airport and transportation master planning processes.	105	-0.64	1.10	-5.93	L
65	Knowledge of requirements and procedures for airlines/aircraft deicing.	102	-0.79	1.37	-5.84	L
47	Understanding of airport capacity, delay and transportation impacts.	105	-0.68	1.21	-5.71	L
50	Knowledge of human resource and employee development processes.	105	-0.53	1.02	-5.36	L
75	Knowledge of building construction codes, methods and processes.	105	-0.59	1.16	-5.19	L
73	Understanding of basic electricity and electronic and application at airports.	106	-0.61	1.22	-5.19	L
35	Knowledge of interpersonal, group and organizational communication.	105	-0.46	0.97	-4.82	L
55	Understanding of ground transport (taxis, buses, shuttles, etc.) operations.	106	-0.62	1.38	-4.63	L
78	Knowledge of building system operation (heat, air, utilities, plumbing).	106	-0.49	1.14	-4.39	L
64	Understanding of parking garage/lot function and operations.	105	-0.54	1.27	-4.38	L
53	Knowledge of military operations and activity on airports.	105	-0.50	1.20	-4.25	L
57	Knowledge of new technology development and application at airports.	105	-0.49	1.21	-4.11	L
60	Understanding of aviation law application to airports and aircraft operations.	104	-0.42	1.09	-3.94	L
71	Knowledge of finance and capital funding methods and processes.	106	-0.45	1.19	-3.92	L
77	Knowledge of helicopter & V/STOL operations.	105	-0.37	1.12	-3.40	L

69	Knowledge of accounting and budgeting methods and processes.	105	-0.41	1.25	-3.35	L
66	Understanding of labor relations.	105	-0.37	1.15	-3.32	L
52	Knowledge of meteorology and flight planning.	105	-0.32	1.07	-3.10	L
62	Understanding of records management and MIS manipulation.	105	-0.34	1.16	-3.03	L
74	Understanding of contract law application to airports.	103	-0.34	1.17	-2.95	L
81	Knowledge of civil engineering principles and practices.	102	-0.28	0.96	-2.90	L
48	Knowledge of speech and public communication principles and application.	105	-0.31	1.10	-2.83	L
67	Knowledge of science principles and their application to airport operations.	103	-0.23	1.07	-2.21	L
84	Knowledge of architectural principles and practices.	103	-0.18	0.94	-1.88	ND
58	Ability to operate light and/or heavy vehicles and equipment.	106	-0.22	1.40	-1.59	ND
30	Use of computer skills associated with word, draw & spreadsheet programs.	104	-0.17	1.14	-1.51	ND
82	Use of computer skills associated with AutoCAD & GIS application.	104	-0.14	1.12	-1.32	ND
79	Understanding of tort law application to airports.	102	-0.15	1.16	-1.29	ND
70	Understanding of the travel and tourism industry.	105	-0.09	1.01	-0.87	ND
88	Ability to speak, read and understand a second languages.	102	0.01	1.20	0.08	ND
80	Understanding of political science and organization politics.	103	0.01	1.10	0.09	ND
76	Understanding of marketing practices & principles.	105	0.05	1.07	0.46	ND
86	Knowledge of applied business statistics.	101	0.07	1.19	0.59	ND
56	Understanding of airport history & development.	105	0.08	1.16	0.67	ND
91	Knowledge of int'l commerce, business practices & handling processes.	103	0.10	0.96	1.03	ND
83	Use of computer science skills associated with programming.	105	0.30	1.27	2.38	R
85	Understanding of social psychology principles & application.	102	0.25	1.01	2.45	R
89	Understanding of geographic and socioeconomic principles.	102	0.26	0.96	2.68	R
87	Understanding of microeconomics (local or national activity).	103	0.39	1.15	3.43	R
90	Understanding of macroeconomics (global activity).	103	0.43	1.15	3.77	R

Notes:
[1] Ranking of knowledge topics according to Quilty's study (2005).
[2] Mean of the means analysis for the two columns.
[3] t -value based on degree of freedom (df = n–1).
[4] $p > 0.05$. L = left column greater than right column. R = right column greater than left column. ND = no significant difference.

APPENDIX B

Comments from airport managers and operations personnel

"Management theories, statistics, and economics are not useful topics at all. Course for airport operations management should be geared toward construction techniques and management, problem solving, conflict resolution, airport documents, Microsoft access, snow removal management, etc."

"Training support used to be strong, [but] now only what is required [is accomplished] due to financial constraints. Knowing what is [a] hazard to safety is part of knowing right from wrong. Must be knowledgeable about a variety of systems, regulations, etc., as we are routinely required to make decisions that have potentially large impact if wrong decision is made. We don't expect new hires to be expert in anything. Through team approach to everyday work we can carry that individual and don't expect them to be at the level of expertise needed for 1-2 years after hiring."

"Our experience has been that 'operational new hires' need a lot of training."

"New hires are typically trained on the job and have no prior experience."

"New hires (no experience) require 2 years on the job training as a rule."

"This is a great study. I hope these results will help you fill in the gaps between skills and knowledge required and what isn't being taught today."

"Larger airports with larger population draw (experience and education) will provide a better candidate base. Small town airports (non-hub/GA) see more candidates from labor based pool or municipal interdepartmental transfer (city/county). More extensive post employment training required."

"Very comprehensive! If new hires have had an internship they are much more prepared for success and will reflect different ratings. My scores were based on hiring some one with prerequisite experience."

"Programs need to put more emphasis on operational subjects and less on management."

"I assume you are asking about new hires/applicants without actual experience, except maybe an internship. My answers are based on this assumption. I don't believe that anyone can be well prepared (and on most items adequately prepared) until they have some OJT and experience."

"Answers are based on our experience operating several GA airports. We tend to hire those with no experience and little formal aviation training /education."

"The role of ops varies widely from airport to airport. Needed knowledge/skills depend on the level of support. At [medium-sized airport], ops officers are solo and are top level management (nights & weekends). Most of our staff has over 10 years experience. Maturity is very important. Lots of gray areas."

"Most of the items listed are not taught in school, [instead are] learned on the job. Depending on the airport, many items are not [a] significant part of an ops position (i.e., economics, labor relations)."

"Most items require the hands-on experience to go into the job well prepared. If they have the general book/academic knowledge of each area, then when entering a position the information can be applied to real world situations."

“It is the application process that I learned the most. I read the material in class, but until I actually apply it, it doesn’t click. Internships are a must! I learned a great deal at my internships.”

“Pilots are much more experienced and prepared in the AOA due to experience with ATC procedures. Much more emphasis should be placed on condition reporting (NOTAMS, snow ops, etc.) and self-inspection, to prepare students for daily job duties.”

“I have not hired any trained airport operation employees.”

“Having common sense is an important strength to have in airport operations. Not only knowing what regulations say, but being able to apply it in a real-world environment. Classes that helped me best in this area are classes that challenged my analytical skills, finance, for example. Being able to assess a situation is extremely important.”

“[This] municipal is a GA reliever for [a medium-hub airport]. Operational personnel cover a wide range of activities from physical labor to administrative projects.”

“We wear many different hats - security, landscaper, janitor, sweeper and park aircraft. NOTE: We love what we do!”

“Most new hire or applicants are not prepared because of poor college courses specifically on Part 139 and airport management.”

“A college program should require AAAE written test leading to a CM prior to awarding a degree. Importance of professional organizations like AAAE and state aviation associations should be emphasized.”

“Since [this airport] is a small primary airport, very few new hires/applicants are processed. With such a small population to draw conclusions from, response regarding their preparation was not submitted.”

“[A large-hub airport] is an airport that is compartmentalized in every way. Unfortunately, operations employees are exposed only to the airfield and its environment. Ops employees are not exposed to finance, master planning, engineering, etc.”

“The training or right column is a function of each individual’s skills, experience, and training/education. As a result, it varies greatly from individual to individual. Our training is based on each individual’s needs.”

Recruitment and Retention of Native American Flight Technology Students

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ABSTRACT

Central Washington University is located proximate to two counties with significant Native American populations, yet Native American students account for a small percentage of the total number of students enrolled in the CWU Flight Technology (FT) program. The retention rate of these students enrolled in FT degrees is significantly less than that of non-Native American students. The purpose of this study is to identify strategies to improve recruitment and retention of Native American students in the FT program. Suggested strategies include: recruitment at the middle school level, involvement with the Gaining Early Awareness and Readiness for Undergraduate Program, offering summer bridge programs, providing opportunities for involvement of families and tribal members, and mentorship assistance through the Native American Student Association.

INTRODUCTION AND PURPOSE

According to the summary of a study conducted by Pavel, Skinner, Farris, Cahalan, Teppeconnic, and Stein, (1999) "data on Native Americans in postsecondary education can be hard to find" (p. 67). The study suggested that this is due to the small percentage of the total U.S. population that claims this race or ethnicity, and that "Native Americans make up the least stable racial-ethnic group in terms of self-identification" (p. 67). Pavel et al. reported that the overall level of educational attainment for Native Americans improved during the period between 1980 and 1990. Although the study revealed that during this time period the high school completion rate for Native Americans 25 years and older increased from 56% to 66 %, the completion rate still lagged behind the 1990 rate of 75% for the total population of all races and ethnicities. Pavel et al. stated that this increased high school completion rate suggested that more Native Americans "will be eligible for college enrollment in the coming years" (p. 68). Shutiva (2003) reported that Native American enrollment in colleges and universities increased by 67% between 1976 and 1994, and the number of baccalaureate degrees awarded to Native Americans during this period increased by 86%. The study by Pavel et al. reported the same increase in baccalaureate degrees for that period and added that the increase in baccalaureate degree recipients of all races and ethnicities increased by 27% for that period.

Pavel et al. reported that Native American enrollments in institutions of higher education (IHE) were highest in states that had large populations of Native Americans, and Washington State was one of five states that had more than 5,000 Native American students enrolled in IHE in 1994. Degree conferrals for Native Americans were also reported by Pavel et al. to be highest in those five states (Oklahoma, Arizona, California, New Mexico, and Washington). The Pavel et al. and Shutiva studies discussed data for the last three decades. Future studies will show if the trends are changing or remaining the same.

United States Census data for the year 2000 shows that 1.6% (n = 94,305) of the population of Washington State claimed American Indian or Alaska Native ethnicity (U.S. Census Bureau, n.d.). The Census data also shows that two counties in close proximity to Central Washington University (CWU) had significantly higher percentages of Native American populations. Yakima and Okanogon Counties had Native American populations of 4.5% (n = 10,016) and 11.5% (n = 4,550), respectively. Despite this proximity of a large population of Native Americans, CWU's Institutional Research (IR) shows the percentage of Flight Technology (FT) students claiming Native American ethnicity during the ten-year period between 1994 and 2004 was 2.31% (n = 17), and the overall percentage of CWU students claiming this ethnicity was 1.92% (n = 660) (CWU, 2005b).

The FT degree completion rate for all specializations (management and pilot) for Native American students was less than half of the completion rate for non-Native American students. During the same ten-year period, 37.84% (n = 272) of non-Native American students enrolled in FT degrees completed a degree in FT, and 17.5% (n = 3) of enrolled FT students claiming Native American ethnicity completed a degree in FT (CWU, 2005b).

Enrollment figures for a neighboring community college that offers a two-year aviation degree show similar enrollment data. Between 2002 and 2004, 0.76% to 2.04% (n = 1 to 2) of the total aviation program student population at Big Bend Community College (BBCC) consisted of Native American students (BBCC, 2005).

The data show that although persons claiming Native American race or ethnicity constitute a low percentage of students enrolled in the FT program, the increasing percentage of such persons completing high school and baccalaureate degrees, especially in the five states identified above (including Washington State), offers the potential for increased recruitment of Native American students for the FT program.

The purpose of this study is to:

1. Identify barriers to college recruitment and retention of Native American students.
2. Determine strategies to improve recruitment and retention of Native American students in the FT program.
3. Identify potential resources to aid the FT program in implementing these strategies.

METHOD

A literature review was employed to determine previously identified barriers to recruitment and retention and strategies for improvement. Suggestions from the literature review were discussed for possible implementation by the FT program. Potential resources currently available at CWU were identified. Recommendations for improvement to recruitment and retention of Native American students in the FT program were made.

LITERATURE REVIEW

Barriers to Recruitment and Retention

Distance from Home and Peers Laughlin (2001) suggested that colleges often ignore nearby potential Native American students in favor of countrywide recruitment efforts. Schiller (2004) hypothesized that Native American college students have unique barriers that make it difficult for them to attend college, including difficulty adjusting to urban settings and separation from familial and cultural ties. Maxwell (n.d.) described unique challenges for Native American college students "including suppressing familial and spiritual beliefs, coping with existing stereotypes, and finding no one on campus with whom to identify" (p. 1). An American Indian/Alaska Native breakout group at a workshop conducted by the National Heart, Lung, and Blood Institute (NHLBI) suggested that Native American students often must move far from home and their support systems in order to attend college, and once there, they have few fellow Native American students and faculty for networking. The group stated that the majority of colleges do not have role models, mentors, or systems for cultural and social support for these students (NHLBI, 2001).

Insufficient Preparation for College

Laughlin (2001) stated that most Native American students attending colleges or universities are first-generation college students. Laughlin hypothesized that the parents of these students might not be familiar with the processes involved in applying to and acceptance by a college, and their school counselors might not be knowledgeable about available college opportunities. Laughlin stated that the "hit and run" recruiting visit that is often used effectively with other students "will not work when recruiting Native (American) students" (Laughlin, 2001, p. 4).

Pavel et al. (1999) stated that an "analysis of a sample of 1992 college-bound high school graduates revealed that the Native American students were, on average, less competitive for the college admissions process than the overall sample" (p. 69). Pavel et al. further cited that from 1982 to 1992, the completion rate for suggested pre-college curriculum increased from 6% to 31% for Native American high school

graduates compared to an increase from 13% to 47% for the overall sample.

Strategies to Improve Recruitment and Retention

College Preparation Laughlin (2001) suggested that tribal education personnel are often more familiar with individual students and families than the school counselors, and they are in a position to help recruiters reach prospective students. Shutiva (2003) recommended that counselors be familiar with specific tribal customs and values and stated that they can help college bound Native American students plan how to continue to honor such customs and values while attending college. Shutiva suggested that teachers and counselors consider advising students about additional financial planning to allow them to contribute to tribal ceremonies while attending college.

A study conducted by Turner, Trotter, Lapan, Czajka, Yang, and Brissett (2006) of a group of 183 adolescent Native American students residing in urban areas suggested "that career counselors who work with Native American young people should specifically attend to teaching them…career exploration, person-environment fit, and goal-setting skills" (p. 223). Such skills include setting "educational and vocational goals based on their exploration of self and the environment" (p. 223). Turner et al suggested that Native American community members and elders be utilized to help the students to develop "social and self-regulated learning skills" (p. 224). Turner et al. reported that their study had several limitations. They stated that the results could not be generalized to Native American students residing in non-rural areas, that causality could not be assumed from their results, and that further testing was required to confirm their hypothesis.

Mentoring and Peer Groups Maxwell (2001) stated that Native American students favor college counselors who are also Native Americans. Maxwell reported that many colleges recognize the benefits derived from providing opportunities for Native American students to be involved with peer groups. Schiller (2004) stated that the Native American Recruitment and Retention Center at the University of California utilizes "student led recruitment and retention projects" for Native American students (p. 8).

Campus Encouragement of Diversity Several western colleges and universities have diversity initiatives. In support of these initiatives, some of these institutions have built or plan to build Native American Longhouses. The University of Oregon (UO) Longhouse opened on January 11, 2005 and replaced a prior Longhouse facility used since the early 1970's. The Longhouse provides, in part, student access, support (undergraduate and graduate) and a location for Native American gatherings (UO, n.d. a). The Evergreen State College's (TESC) Longhouse Education and Cultural Center opened on TESC campus in 1993. The Longhouse provides Native American students with a meeting place for student groups, academic support services, and information on scholarships (TESC, n.d.). CWU's Diversity Initiative has a memorandum of understanding with area tribes to promote "unity and cooperation between Native American Indian students, Signatory Tribes, and CWU" (CWUa, n.d. p. 3). The University has preliminary plans for a Native American Cultural Center (Follette, 2005).

Summer Bridge Programs UO's English department offers a summer bridge program for incoming Native American freshmen to help them prepare for college life (UOb, n.d.). Arizona State University (ASU) conducts a summer bridge program for Native American students. The five-week program introduces students to college life, provides courses designed to increase student success, teaches college skills, and provides Native American scientist and engineer role models (ASU, n.d.). Ohio State University (OSU) offers a multi-year bridge program for Native American and other minority students. The program has a summer component that begins three weeks prior to the beginning of the freshman year. OSU's program provides "culturally-relevant intervention, support, and advising to ensure a seamless transition from high school to college" (OSU, n.d. p. 1).

Gaining Early Awareness and Readiness for Undergraduate Program (GEAR UP) The U.S.

Department of Education offers six-year GEAR UP grants to states and partnerships to provide programs in low-income areas to encourage and prepare middle and high school students for college. The program works with cohort groups, starting no later than seventh grade and continuing through high school (U.S. Department of Education, n.d.).

In October 2002, CWU received a $4.74 million GEAR UP grant to help middle school students prepare for college. The purpose of the grant program is to "develop student enrichment activities, tutoring programs, teacher development institutes, and parental and community involvement" as well as provide information on "financial aid availability, college admission procedures, and career planning" (CWU, 2002, 5). The initial program served five central Washington school districts located in or near Yakima County. In October 2005, CWU received an additional $4.7 million GEAR UP grant to extend its project to seven more school districts located in or near Okanogan County (CWU, 2005a).

DISCUSSION

Pre-College Advising Prospective FT students who plan to enroll in flying specializations need to plan and prepare for the additional financial cost of flight training. The FT program requires a separate application process for FT students, and the program requires academic standards in addition to those imposed by the university for all incoming students (C. Hedrick, personal correspondence, April 7, 2006).

Recruitment Proximity The FT program has a limited recruitment travel and brochure budget ($1,544 for the previous twelve months), and a classroom lecturer is assigned the additional duty of visiting high schools within the state of Washington (C. Hedrick, personal communication, April 7, 2006). CWU is a state institution and the majority of students (94% [n = 7,857]) enrolled for fall of 2005 at the Ellensburg campus were Washington residents (CWU, 2005b). Recruitment efforts focused in Washington State, specifically in Yakima and Okanogan counties, have the potential to reach a large target population and would help keep recruitment costs within the limited budget. Additionally, Native American students recruited from these counties would have closer access to their peers and families. Proximity to recruitment areas increases the opportunities for FT recruiters to make initial and follow up contacts with tribal educators and school counselors regarding financial planning, the FT application process, and appropriate high school curriculum.

CWU Diversity Support CWU has a chapter of the Native American Student Association (NASA), a nationwide organization "designed to provide opportunities for American Indians and Native Alaskans pursuing studies in science, engineering, and technology arenas" (CWUb, n.d. p. 2). The chapter sponsors Native American cultural activities on campus (CWUc, n.d.). NASA provides mentorship opportunities for potential students. Although CWU does not have a Longhouse, a Native American Cultural Center is in the preliminary planning stage (Follete, 2005).

CWU GEAR UP Program The purpose of CWU's GEAR UP program is to improve CWU's recruitment and retention of students from low-income backgrounds. The school districts involved with the program are located within the two neighboring counties with large Native American populations. The GEAR UP program could be a valuable resource to the FT program in terms of both networking with targeted school districts and potential financial assistance for FT program involvement.

RECOMMENDATIONS

1. Begin recruitment at the middle school level in schools in local and neighboring counties, make follow up visits at least once a year, and maintain contact with interested students. Appropriate and timely guidance for early curriculum and financial planning prepares students for acceptance into the FT program.
2. Make contact with Title VII coordinators, tribal elders, parents, and others involved with Indian education programs to solicit their suggestions and continued assistance. Maintenance of cultural ties improves likelihood of retention and successful degree completion.

3. Enlist the assistance of financial aid, admissions, and student support services personnel when visiting target schools. Timely financial planning improves the likelihood that students can finish the FT program and set aside additional funds to support cultural activities.
4. Investigate the possibility of offering a summer bridge program for Native American students. A bridge program offers college-bound Native American students an opportunity to experience college life prior to beginning college and to begin forming relationships with mentors.
5. Enlist the assistance of NASA or other Native American on-campus organizations. Such organizations provide opportunities for mentoring and networking with the Native American students.
6. Provide opportunities to allow Native American FT students to invite their families and tribal members to meet with FT faculty, observe the operation of the program, ask questions, and discuss concerns. Such opportunities recognize the importance of maintenance of familial and cultural ties.
7. Research available on-campus resources, such as GEAR UP programs and NASA chapters, for networking and possible financial assistance.

Limited program faculty, staff, and budget dictate careful selection of strategies. Integration and utilization of existing resources can assist recruitment and retention efforts. Recruitment efforts limited to local and neighboring counties will help keep recruitment expenses within limited budgets.

FT program recruiters should heed the advice of Laughlin (2001) to avoid the "hit and run" style of recruitment (p. 4). Successful recruitment and retention requires continuing coordination with targeted school districts, tribal personnel, campus financial aid and admissions personnel, and Native American campus resources. A "hit and run" effort might be more detrimental to recruitment and retention than no effort at all.

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Characteristics of Cooperative Education and Internship in Aviation Management Programs

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ABSTRACT

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 (AVM) programs differentiate between cooperative education and internship. The study was delimited to: community colleges, colleges, and universities affiliated with the University Aviation Association (UAA) having AVM programs that participate in cooperative education and/or internship.

Carbondale (SIUC) AVM is a Baccalaureate degree program. The purpose of the AVM program is to prepare graduates for entry-level management positions in the aviation industry. Students enrolled in the AVM major are encouraged to complete the requirements of an aviation-related associate degree or to have equivalent licensing, aviation-related work experience, cooperative education experience, internship experience, or technical training ("Undergraduate Curricula," 2006, p. 181).

In the NewMyer, Ruiz, and Rogers (2000) study of cooperative education and internship partnerships between U.S. airlines and aviation-related university flight programs, the researchers compared and contrasted the "top 12 internship programs." Their study defined "cooperative education" and "internship" specifically in the context of an agreement between an industry sponsor and an academic institution's aviation program. The National Commission for Cooperative Education (NCCE) (as cited in NewMyer et al.) described cooperative education as:

> … a structured educational strategy integrating classroom studies with learning through productive work experiences in a field related to a student's academic or career goals. It provides progressive experiences in integrating theory and practice. Co-op is a partnership among students, educational institutions and employers, with specified responsibilities for each party. (p. 113)

And, according to NewMyer et al.:

> Internships involve spending a pre-arranged period of time working in a field of study or interest. The 1998 Southern Illinois University at Carbondale (SIUC) Undergraduate Catalog defines an aviation occupational internship as …an unpaid internship position…performing duties and services in an instructional setting as previously arranged with the sponsoring work-site supervisor. (p. 113)

In July 1987, SIUC and United Airlines (UAL) signed a formal agreement to establish one of the first major airline-university internship agreements (NewMyer, Ruiz, & Worrells, 1998). The purpose of such an internship, according to Spencer (1988), is to:

1. Develop additional resources for high quality flight officer candidates.
2. Improve the supply of qualified flight officer candidates.
3. Increase the number of qualified minority and female flight officer candidates.
4. Take advantage of the college and university system as a resource of the pilot of the future.

Internships that provide an opportunity to combine on-campus academic learning with professional work experience and that "bridge the gap" between the classroom and the world of work have become increasingly valuable to

interns, participating institutions, and industries (Phillips, 1996). Internship activities have expanded from the initial flight operations internship where students are active in various and sundry administrative tasks to becoming familiar with flight crew training, customer relations, maintenance operations, and dispatch. Internships have also developed outside of the airline industry and are commonly conducted by aerospace manufacturers, airport authorities, education/training facilities, and fixed base operators (Schukert, 1993). In an earlier study by Thiesse, NewMyer, and Widick (1992), five basic types of internship were identified: (a) academic, (b) departmental rotation, (c) job-shadowing, (d) single department, and (e) specific task.

The numbers and types of industry sponsors have also expanded beyond the original SIUC-UAL partnership (D. A. NewMyer, Personal Communication, 2003, December 5). Students regularly participate in either a flight and/or a non-flight internship. A representative listing of industry sponsors includes, but is not limited to:

1. Aerospace manufacturing companies
2. Aircraft maintenance companies
3. Airport administrators
4. Aviation consultants
5. Federal Aviation Administration
6. General aviation companies
7. Illinois Department of Transportation
8. National Transportation Safety Board
9. Professional aviation organizations

The diversity of internship activities in which students participate is not unlike those reported by Schukert (1993, May), who found that most interns work for government organizations or the airlines. In a study based upon a geographical distribution of 119 UAA members, Mitchell (2000), surveyed 17 universities, 14% of the UAA membership at that time, and found that:

1. Nine internship categories existed overall and that each school responding had an average of six internship programs.
2. The nine categories of internship were reported as: (a) major airlines, (b) general aviation, (c) airport authorities, (d) regional airlines, (e) aviation services, (f) corporate aviation (g) government, (h) aviation manufacturing, and (i) professional associations.
3. Airlines were the most consistent industry sponsors.
4. All institutional sponsors reported internship agreements.
5. Several institutional sponsors had established and staffed an internship office for student placement and coordination.

REVIEW OF LITERATURE

The Evolution of Aviation Management

The roots of present day Aviation Management programs can be traced back to the Civil Pilot Training (CPT) program of World War II (Strickler, 1993). At that time, the demand for pilots was so great that civilian institutions were called upon to supplement military training programs. After World War II and through the 1970s, the pathway to a career in aviation had been turned around and the military became the primary source of aviation professionals for the commercial aviation industry. By the middle of the 1980s, the military could no longer keep pace with the demand for aviation professionals. This trend continued and by 1995 civilian institutions had emerged as the primary source of personnel for commercial aviation. Not only had the source of personnel shifted, but it was also found that the most desirable personnel qualifications had expanded from technical skills to include administrative and managerial skills as well.

Military trained aviation professionals. The CPT program of World War II established the foundation for partnerships between colleges, the military, and the aviation industry. Established in 1939 and lasting until 1944, the CPT program was the largest pilot training program ever undertaken. It began with 13 colleges and 330 students who received college credit for ground school courses. By 1944, it had expanded to 1,132 colleges, with 1,460 private aviation contractors providing “for credit” flight instruction to 435,165 pilot candidates (Strickler, 1993, p. 17).

In the decades that followed World War II, the military established itself as a pathway to professional careers in the civil aviation

industry. Military trained personnel were prime candidates for careers in the aviation industry due to their numbers and availability, experience, and qualifications. Another factor that made military aviators attractive prospects was that their experience and qualifications came at no cost to the civil aviation industry.

Collegiate aviation program Reliance on the military as a source of aviation personnel continued through the mid-1980s. From about 1985 through 1995, however, the military as a source of supply of aviation professionals was reduced by 40% (Hansen & Oster, 1997, p. 54). This reduction was due to: a drawing down of the military's force size and the success of military efforts to retain critical personnel. According to Kennedy (as cited in NewMyer, 1991), these two factors coincided with increasing retirements in the ranks of civilian aviation personnel. The cumulative effect was an increased demand for aviation professionals and a smaller pool of potential employees.

Lindseth (1996) found that increasing numbers of baccalaureate aviation programs in the United States were related to economical factors, increased air travel, and a decrease in the supply of aviation professionals from the military. The shift from the military to civilian sources of personnel and the natural attrition of experienced aviation personnel from the industry focused the search for qualified aviation professionals on colleges and universities. Recognizing that the pathway to a career in aviation had shifted from the military to the civilian sector, Karp (2000) suggested that it might be time for a fundamental change in collegiate aviation education. Oster stated: "As we look to the future, our committee concluded that collegiate aviation programs were likely to become the dominant path into the aviation industry, not only for pilots and aviation maintenance technicians, but for management as well" (as cited in Mitchell, n.d., p. 2). The end result was that the aviation industry would need to rely to a much greater extent on civilian sources for technical and administrative/managerial personnel.

The Emergence and Growth of Aviation Management Programs Aviation management degree programs began to emerge when it was recognized that highly technical aviation careers also demanded a certain degree of managerial skill. According to Fairbairn (1987): "Students graduating from aviation programs frequently move into careers that have a significant management component. As a result, aviation management courses have evolved in aviation curricula to prepare graduates for these positions" (p. 77). Fairbairn further noted that the objective of aviation management courses, "… should be to provide enough depth in the unique aspects of a particular field of aviation to enable the student to engage in critical analysis and problem solving in that field" (p. 77). Lastly, Fairbairn pointed out that:

> … courses should be structured in a manner that allows students to integrate material and apply management skills. What is needed is … to develop activities which will meet the objectives of these courses. Programs must be developed to allow direct observation of a students [sic] abilities in a managerial role. (pp. 77, 89)

In 1968, there were approximately 20 baccalaureate aviation education programs in the country. By 1996, there were 276 postsecondary education institutions in the United States offering non-engineering aviation programs. Of these, 70 offered baccalaureate degrees in administration/management disciplines: aviation administration, airport management, aviation maintenance management, and air traffic control. Each of these programs involved some form of flight education. There were six additional programs, however, that offered a non-flight AVM degree (Lindseth, 1996). In 2003, 114 postsecondary institutional members of the UAA reported that there were 72 AVM programs: 21 associates, 44 bachelors, and 7 masters (Williamson, 2003). Seven of these were reported as non-flight AVM programs.

The Council on Aviation Accreditation (CAA) has recognized the significance of stand alone AVM programs. The CAA Accreditation Guidelines (2003) specify that:

> For baccalaureate degree programs, the Aviation Management option MUST consist of a minimum of 36 semester hours in a coherent sequence of business and

> aviation courses designed to prepare the student to function effectively as a manager in a selected segment of the aviation industry. The combination of business and aviation courses SHOULD be designed to provide breadth of understanding of basic business principles and a depth of understanding of the particular segment of the aviation industry. Each school is free to specify the area of preparation, but it MUST provide focus on a potential career field rather than be an extension of the general approach provided by the core. (p. 28)

Cooperative education and Internship in Aviation Management

Aviation-related partnerships between business and education began as maintenance apprenticeships. Gradually, they evolved to include cooperative education opportunities and internships in flight and management. Throughout this evolution, there were no accepted standards for these types of activities. Their definitions and applications were as diverse as the students, industry sponsors, and institutions that participated in them.

Cooperative education and internship have evolved in parallel with, and as significant components of, aviation management programs. As AVM programs gained acceptance and grew into separate baccalaureate degrees, cooperative education and internship became institutionalized as essential components of and have been major factors in AVM program maturation.

Cooperative education. In 1971, LaGuardia Community College established the first mandatory cooperative education requirement in aviation at a community college in the U. S. Enrollment in 1971 was 500 students. By 1998, it was recognized as a leader in cooperative education with one of the largest cooperative education programs in the country. Enrollment had grown to approximately 10,000 students, 2000 of whom participated in cooperative education and/or internship with over 300 industry sponsors. “Individual internships are often sought which relate to the student’s course of study, and students attend seminars in which they study issues such as workplace cultures and career-building skills” (Bailey, Hughes, & Barr, 1998, p. 14).

Soon after becoming a university in 1971, Embry-Riddle Aeronautical University (ERAU) developed a cooperative education program. The purpose, according to Howell and Scott (2001), was to develop students’ professional and personal aspirations and to guide their life in the direction of a sound career. “Our goal was to be practical, motivating and distinctive and to serve students, alumni, faculty and staff, as well as industry” (Howell & Scott). Participants were provided an opportunity to bridge the gap between the classroom and work environment and to earn credit hours toward an undergraduate/graduate degree.

The Northrop/California State University, Fullerton Invitational Program in Operations Management was established in 1983. This program allowed students to work within Northrop’s Operations Department in a variety of areas during the summer. Northrop also maintained an active cooperative education program with other universities allowing students to alternate between work and study (McCarthy, 1984).

The applied research partnership program developed at Purdue University exemplifies how cooperative education and internship can be integrated within an AVM program. The program was initiated in 1996 in response to industry representatives who complained of a significant adjustment period for graduates entering aviation careers (Morton, Eiff, & Lopp, 2001).

> While aviation industry employers generally agree that aviation education programs are providing excellent foundational technical and managerial knowledge and skills, they continue to report that students lack confidence in applying their education during the initial phases of their aviation careers. Additionally, industry feedback often indicates that students lack comprehensive knowledge of aviation industry settings and processes. Graduates are generally reported to understand the concepts of problem solving, project management, team building and work analysis but demonstrate a

> weakness in applying those concepts within the context of their aviation work settings.

Internship Internship provides opportunity to combine on-campus academic learning with professional work experience and "bridge the gap" between classroom and the world of work are increasingly valuable to interns, participating institutions, and industry (Phillips, 1996). Internship activities have expanded from those in which the intern is actively involved in various and sundry administrative tasks within a flight operations environment to working in flight crew training, customer relations, maintenance operations, and dispatch. Internships have also developed outside of the airline industry and are commonly conducted by aerospace manufacturers, airport authorities, education/training facilities, and fixed base operators (Schukert, 1993).

Cooperative education and internship From 1971 throughout the 1990s, cooperative education and internship programs continued to evolve into an integral component of aviation-related degree programs. However the lack of standardization, as previously noted, continued to persist. Accordingly, the definition of "internship" and "cooperative education" varies from campus to campus and department to department. "Internships" at one university reflect the definition of "co-op" at another (Allen, Kielbaso, & Dirkx, 1999, p. 9).

Leasure and Stanley (2000) discussed cooperative education and internships in general terms. They differentiated between the two with the observation that "…the cooperative education process is more rigidly defined and therefore is less adaptable to innovation" and "… co-op students are receiving pay for their efforts and have the expectation of continued employment for the duration of their contracts" (p. 14). A noteworthy comparison made by NewMyer et al., is that:

> The primary difference between an internship and a co-op is that internships are usually unpaid work experiences, while co-ops are salaried. Also, co-ops typically require that the student alternate between multiple periods of pre-arranged work assignments and semesters of traditional on-campus academic learning. (p. 113)

In 1999, the UAA Curriculum Committee convened to develop standard practices and procedures for the establishment and application of cooperative education and internship in aviation-related programs. The *Internship Program Guidelines* were published as a result of the committee's efforts. "This document sets forth representative guidelines and procedures that may be used in establishing intern programs for two- and four-year college students from aeronautical curricula with employers representing the public and the private sectors of aviation" (UAA, 1999, p. 1). The guidelines provide structure and at the same time provide flexibility in their application. For example:

> … paid or unpaid opportunities for students to function in a typical 'on the job' environment where they can acquire knowledge and useful experience. The number of work hours required each week as well as the length of the internship period will vary depending on program design factors such as the academic schedule of students, number of hours student will be available for work, the grouping of hours, individual candidates' schedules, transportation requirements and type of work product. (p. 1)

METHODOLOGY

A descriptive research method that employed a self-report research instrument was used to collect data for the study. According to Best and Kahn (2003):

> A descriptive study describes and interprets what *is*. It is concerned with conditions or relationships that exist, opinions that are held, processes that are going on, effects that are evident, or trends that are developing. It is primarily concerned with the present, although it often considers past events and influences as they relate to current conditions. (p. 114)

More specifically, survey research was used to identify and describe the perceptions of aviation management program representatives

regarding the characteristics of cooperative education and internship.

Subjects

The point of departure for the study consisted of 114 institutional members of the UAA as listed in the *Collegiate Aviation Guide* (Williamson, 2003). The *Guide* contains an "Alphabetical Listing with Options and Degrees" offered by various colleges and universities that was analyzed to identify programs having an "Aviation Management/Airway Science Management" curriculum. Following the analysis, 77 institutional members were designated as having met the following definition of aviation management according to the U.S. Department of Education's (2000) *Classification of Instructional Programs* and which also participate in cooperative education and/or internship.

> A program that prepares individuals to apply technical knowledge and skills to the management of aviation industry operations and services. Includes instruction in airport operations, ground traffic direction, ground support and flight line operations, passenger and cargo operations, flight safety and security operations, aviation industry regulation, and related business aspects of managing aviation enterprises. (para. 6, 49.0104)

The 77 UAA programs meeting this criterion were designated as the target population. To validate the population, a pre-survey procedure was conducted as follows.

1. An e-mail letter of solicitation was sent to each of the 77 institutions, requesting information regarding the AVM curriculum, participation in cooperative education and/or internship activities, and a willingness to participate in the study. Descriptive information regarding the program and designation of a contact person to complete the survey were also requested. The e-mail messages were sent on October 19, 2004.
2. On October 20, 2004, 10 messages had been returned with the notation "reason: 550 Host unknown." The 10 addresses were ultimately corrected via telephone contacts and searches of institutional web sites, after which the 10 e-mail messages were resent by October 25, 2004.
3. By November 3, 2004, 42 institutions had responded, 36 of which indicated a willingness to participate in the study. A second e-mail message was sent on November 4, 2004. The original message was supplemented with a statement indicating that this was a second attempt to solicit information. A deadline of November 10, 2004, was established at which time telephone calls would be made to those not responding as well as to those that had indicated "No Interest" to either of the preceding e-mail messages.
4. On November 12, 2004, follow-up telephone calls were initiated. Although frustrating at times, this effort proved to be worthwhile. In one instance a community college thought to have an AVM program reported that they did not, however, that same institution referenced another AVM program not previously identified. As a result the target population grew to 78.
5. By the beginning of January 2005, information had been received from 78 institutions. Four institutions were eliminated because they did not have an AVM program and four others were eliminated because they did not participate in cooperative education and/or internship. As a result, the accessible population consisted of 70 institutions having AVM programs and which offer cooperative education and/or internship. Fifty-six of these are university level institutions and 15 are accredited by the Council on Aviation Accreditation.

Instrumentation

Information to develop the survey was drawn from three sources: (a) survey research instruments previously developed by Bargar, Fones, Lave, and Staley (1973); Bragg et al. (1995); Mason (1985); Raiola, Kibler-Hacker,

Potter, and Reed (1991); and Thiesse et al. (1992), (b) relevant literature regarding cooperative education, internship, and other forms of work-based learning by Prather (1999), Ruiz (2003), and Schukert (1993, May), and (c) the author's knowledge and perceptions regarding work-based learning within aviation management programs.

Multiple drafts of the research instrument were developed over the course of several months. The final draft of the survey was completed in March 2005 after which the instrument was submitted to a jury for an analysis of content validity. Comments and suggestions from the validation panel were incorporated into a revised final draft.

To assess reliability of the instrument, a pilot test was conducted by 10 aviation management professionals representing universities or professional aviation organizations in April 2005. Comments and suggestions resulting from the pilot test were used to develop the final version of the instrument.

As a result of the validation panel review and the pilot test, the instrument was assumed to be valid and reliable. The research instrument was subsequently reviewed and approved for use by the Southern Illinois University Human Subjects Committee.

Data Collection Procedures

During the process of developing the survey instrument, it was determined that the most efficient method of gathering data would be an on-line survey. To accomplish this task, Instructional Support Services (ISS) in the Department of Library Affairs at Southern Illinois University Carbondale was contacted for assistance. The ISS staff recommended the use of a software program called "Surveys,"

> It was developed at UIUC. It aids in the creation of online survey forms that can be installed on a central server for distribution over the web. Survey questions can be of many types, including multiple choice, Likert scale, short answer, or free text. Responses are sent to a database for collection and analysis. What it lacks in sophisticated control mechanisms it more than makes up in simplicity of use. (H. Carter, personal communication, December 16, 2004)

A one hour orientation, followed by a brief question and answer session was provided by ISS personnel. The paper copy of the instrument was easily converted into an on-line survey with only a minimum of manual HTML coding required. Only one item required modification to accommodate a format limitation of the software.

The survey was disseminated to the 70 AVM program representatives via e-mail on May 31, 2005. The e-mail message included a hyper-link that allowed each participant to connect directly to the survey web site. The compatibility between the on-line survey and the paper copy is such that only a few minor problems were encountered by respondents. The first completed instrument was received on May 31, 2005, and the last was received on August 15, 2005.

Treatment of the Data

Analysis of raw data began soon after receiving the last survey. One advantage of an on-line survey is that raw data are readily compiled without having to manually code and enter the data. Conventional descriptive statistics were used to tabulate and analyze the data. Data interpretation was based upon logical and analytical means.

The questionnaire consisted of 12 categorical items designed to gather data on the perceptions of AVM representatives. The data gathered from the 12 questions were related to the perceived differences of cooperative education and internship.

CHARACTERISTICS OF COOPERATIVE EDUCATION AND INTERNSHIP

Cooperative education began in the early 1900s as an alternate form of vocational/technical education in which students work full- or part-time at a paid job under the direction of a workplace supervisor. The purpose of the employment is to learn specific occupational skills on-the-job rather than in a school-based shop or laboratory. The cooperative education experience includes a written training agreement among the student, school representative, and employer and requires

a training plan that lists specific objectives to be achieved. Cooperative education has generally been perceived as a very successful type of vocational/technical education at both the secondary and post-secondary levels.

The internship is a newer approach that became prominent on community college and university campuses in the 1960s in the more traditional academic areas. Internship is perceived as a way of providing students with practical experience and exposure to the work-place that is not achieved in a conventional classroom setting. Most interns work full- or part-time for a semester or less and may or may not receive compensation. Generally, the internship is less structured than cooperative education and may not require a training agreement and training plan.

Cooperative education and internship have always played an important role in aviation programs. Early on, cooperative education fulfilled a need by providing practical experience for those pursuing technically-oriented aviation occupations. Aviation management programs evolved from a non-technical option for professionally-oriented aviation occupations. Over time, AVM programs created an identity of their own separate and distinct from the more technical programs that prepare pilots, mechanics, dispatchers, air traffic controllers, and the like.

As AVM programs have evolved, so too has the application of cooperative education and internship. Both are used to provide AVM students with experiential learning opportunities. However, there is some anecdotal evidence which suggests that AVM program administrators and faculty often use the terms interchangeably and that traditional distinctions between cooperative education and internship may be diminishing.

The research instrument is designed to compare perceptions of AVM program representatives to traditional conceptions of cooperative education and internship. Twelve characteristics of cooperative education and internship were provided; with items 1, 5, 6, and 10 being typical characteristics of cooperative education and items 2, 4, and 11 being typical characteristics of internship. Items 3, 7, 8, 9, and 12 can be associated with one or both.

The data is summarized in Table 1 and Table 2. The first table shows individual responses to each characteristic. For example, 51 individuals responded to the first item indicating that the characteristic is associated with 9 cooperative education programs, 25 internship programs, and 17 respondents indicate that it applies to both cooperative education and internship. An unusual and inexplicable facet of this data is that, although a total of 53 individuals completed the survey, the number of responses to individual items ranges from 28 to 53.

The more meaningful data are shown in Table 2 which allows a direct comparison between the characteristics of cooperative education and internship. This table was constructed by adding the number of frequencies for “both” to cooperative education and internship, for example, 17 responses for item one have been added to cooperative education and internship.

Overall, the data in Table 2 shows that the 12 characteristics of cooperative education and internship apply more to internship than to cooperative education. These findings are unexpected, particularly in relation to traditional characteristics of cooperative education. For instance, “learning occupational skills for employment,” “alternating academic terms,” “receiving compensation,” “written training agreements,” and “conventional letter grades” are associated more frequently with internship than with cooperative education.

Table 1. *Characteristics of Cooperative Education and Internship*

	Characteristic	Cooperative Education	Internship	Both	
		f	*f*	*f*	*N*
1.	The primary objective is to learn occupational skills for employment.	9	25	17	51
2.	The primary objective is to gain familiarity with the general work environment.	10	32	11	53
3.	Is a required component of the AVM program.	6	16	11	33
4.	Typically one academic term in duration.	5	32	15	52
5.	May alternate, for an academic term or more, between the campus and the work-site.	13	19	9	41
6.	Participants receive compensation.	11	22	10	43
7.	Written (training) agreements are required.	10	24	13	47
8.	Training plans listing specific objectives are required.	9	18	13	40
9.	Specific course title(s) and catalog number(s) apply.	8	26	16	50
10.	Conventional letter grades (A, B, C, etc.) are assigned.	7	25	10	42
11.	Pass/Fail (P/F) grades are assigned.	9	12	7	28
12.	A specific number of credit hours may be earned.	7	25	19	51

Table 2. *Direct Comparison of Cooperative Education and Internship Characteristics*

	Characteristic	Cooperative Education		Internship		
		f	%	*f*	%	*N*
1.	The primary objective is to learn occupational skills for employment.	26	38.2	42	61.8	68
2.	The primary objective is to gain familiarity with the general work environment.	21	32.8	43	67.2	64
3.	Is a required component of the AVM program.	17	38.6	27	61.4	44
4.	Typically one academic term in duration.	20	29.9	47	70.1	67
5.	May alternate, for an academic term or more, between the campus and the work-site.	22	44.0	28	56.0	50
6.	Student participants receive compensation.	21	39.6	32	60.4	53
7.	Written (training) agreements are required.	23	38.3	37	61.7	60
8.	Training plans listing specific objectives are required.	22	41.5	31	58.5	53
9.	Specific course title(s) and catalog number(s) apply.	24	36.4	42	63.6	66
10.	Conventional letter grades (A, B, C, etc.) are assigned.	17	32.7	35	67.3	52
11.	Pass/Fail (P/F) grades are assigned.	16	45.7	19	54.3	35
12.	A specific number of credit hours may be earned.	26	37.1	44	62.9	70

Conversely, the findings for traditional internship characteristics were expected. That is, characteristics dealing with "gaining familiarity with the work environment," "one academic term in duration," "pass/fail grades are assigned" are more frequently associated with internship than with cooperative education.

Regarding the remaining characteristics, the majority of respondents associate "a required component of the program," "written training agreements are required," "training plans are required," "course titles and catalog numbers apply," and "specific number of credit hours apply" with internship more so than with cooperative education, even though these characteristics have traditionally been associated equally with either cooperative education or internship.

For item 12, respondents were asked to indicate the range of credit hours allocated for cooperative education and internship. Interestingly, for both cooperative education and internship, 1 to 6 credit hours is the most frequently reported range by 19% and 30% of respondents, respectively. The highest reported range for either cooperative education or internship is 1-12 credit hours, as reported by 16% and 18% of respondents, respectively.

SUMMARY AND CONCLUSIONS

Aviation management is a degree program comprised of technical and non-technical coursework, initially functioning in a secondary role to the more technical curriculum designed for pilots, technicians, air traffic controllers, and the like. Aviation management has emerged as an autonomous degree program that prepares graduates for entry-level, non-technical careers in the aviation industry. As AVM has undergone a technical to non-technical transition, so too has the application of cooperative education and internship therein.

Cooperative education and/or internship has and continues to be, an important component of AVM. Although cooperative education and internship are distinctly different from one another, evidence has emerged that the distinctions are becoming less pronounced. Studies of cooperative education and internship suggest that the terms cooperative education and internship are often used synonymously, the terms are regularly reversed, and their traditional characteristics are frequently not understood or they are misapplied.

The application of cooperative education and internship parallels the technical to non-technical transition that AVM programs have undergone. Initially, cooperative education provided technically-oriented AVM students an opportunity to acquire occupational skills for subsequent employment. More recently, internship has come into greater use to provide non-technical AVM students opportunities to observe and gain familiarity with prospective career fields.

The purpose of this study was to identify, analyze, and describe the characteristics of cooperative education and internship activities in post-secondary aviation management programs. The study was limited to colleges and universities affiliated with the UAA.

A self-developed research instrument was used in the study. A pre-survey was employed to identify 70 AVM programs having cooperative education and/or internships and who agreed to participate in the study. Survey participants were directed to an on-line questionnaire. Fifty three (75.7%) provided input for analysis of the characteristics of cooperative education and internship. Data were analyzed using conventional descriptive statistics.

RESULTS AND CONCLUSIONS

To what extent do AVM programs that participate in cooperative education and/or internship differentiate between them?

Twelve traditional characteristics of cooperative education and internship; five associated with cooperative education, three associated with internship, and four associated with both made up the survey. Despite these distinctions, survey respondents more frequently associated all 12 characteristics with internship. Therefore, as the findings reveal, there is little or no distinction drawn between cooperative education and internship.

SUGGESTIONS FOR FURTHER RESEARCH

As a consequence of conducting this study, the following additional research is suggested or needed:

1. The population of the study consisted of UAA member institutions. It would be interesting to investigate the characteristics of cooperative education and internship in institutions not affiliated with the UAA.
2. A focused survey should be conducted that targets leading or key innovators in the field regarding their attitudes, perceptions, and opinions on these specific issues: cooperative education and internship as a required component of AVM programs, and whether cooperative education should continue to be offered when internship is preferred and meets program objectives.
3. Case studies of successful, exemplar programs should be investigated to determine best practices which would serve as models to be adopted by other programs to improve and expand cooperative education and internship.

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