# AN EXAMINATION OF THE INDIANA STATE UNIVERSITY AEROSPACE ADMINISTRATION PROGRAM

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## ABSTRACT

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

## INTRODUCTION

Only after students graduate are they able to step back and evaluate the value of their program's curriculum in their careers. Faculty may be so busy teaching and performing administrative duties that they do not take the time to examine the adequacy and sufficiency of the current program. Also of significance in evaluating a program is feedback from employers once graduates are out in the field. Thus, an evaluative case study of a given university program involving graduates, faculty, and employers is most appropriate for assessing the value of that program.

The following case study of the Indiana State University (ISU) aerospace administration program is such a study. The structure of the study,

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methods used, and findings are presented here as a model for other universities to define and explore their own programs and make best use of the feedback obtained from graduates, faculty, and employers. In turn, this feedback may be used for recommendations to improve a given program toward greater applicability to current industry standards, university accreditation, and student and graduate satisfaction.

## STATEMENT OF THE PROBLEM

This case study examined possible sources of declining enrollment over the past 10 years in the ISU aerospace administration program. In 1991, as reported in 1991 by the Dean the ISU School of Technology (SOT), of approximately 350 students in the Department of Aerospace Technology, the aerospace administration program had an enrollment of 105 students, representing approximately 30% of the total enrollment. After a period of declining enrollments, total department enrollments recovered and increased to 239 students making the Department of Aerospace Technology the largest in the SOT. However, the number of students in the aerospace administration program decreased to 29, or only 12% of the department total.

## PURPOSE

The research reported here is part of a larger case study, which evaluated and made extensive recommendations for improvement of the aerospace administration program at ISU, with the goal of accreditation by the nationally recognized Council on Aviation Accreditation (CAA). The paper reports primarily on the several ways in which the program was evaluated and offers several pertinent recommendations.

This case study evaluation of the ISU aerospace administration program took place through five modes. These were benchmarking; comparisons with criteria for excellence in aerospace administration programs, as mandated by the CAA; comparisons with other CAA-accredited university aerospace administration programs; the results of surveys administered to graduates, faculty, and potential employers of ISU aerospace administration graduates; and an external audit of the aerospace administration program by the University Aviation Association (UAA). The case study approach is particularly appropriate in evaluations of programs, with systematic study and multiple qualitative and quantitative methods (McMillan & Schumacher, 1997).

## RESEARCH QUESTIONS

Four research questions were formulated to guide this case study.
1.  What does the literature review provide as the appropriate and valid criteria for an excellent aerospace aviation management

program, as indicated by accrediting agencies, professional industry organizations, and other university programs?

2.  What instrument is appropriate to measure graduate, faculty, and employer feedback with regard to the present aerospace administration program?
3.  Do significant gaps exist between the established criteria for excellence of an aerospace administration program and the present program at ISU?
4.  What recommendations can be made to enhance the quality of the aerospace administration program at ISU?

## Limitations and Delimitations

This case study was designed to evaluate the gaps between CAA accreditation standards and the aerospace administration program at ISU. Thus, findings can be generalized only to highly similar settings. Given the unique nature of the ISU aerospace administration program, it is unlikely that this study is completely replicable at another institution. However, efforts were made to ensure a substantial framework of detail and discussion for replication.

With regard to the comparison of the ISU program with those of the four CAA-accredited programs at sister universities, although close review of program coursework was conducted, review of these universities' self-studies was not conducted. Thus, it is possible that some conclusions concerning how certain programs met CAA standards were inaccurate. Nevertheless, in each case, all programs had met CAA standards and received CAA accreditation.

With regard to the instruments, although selection and development of some survey items were based on informed recommendations of the expert committees and the researcher, other relevant items may have been omitted, such as employers' formal aviation industry education or graduate school experience. In addition, each survey instrument was developed for a specific subject base and field-tested with small samples. Thus, survey results may lack some reliability and validity.

## LITERATURE REVIEW

### Benchmarking

Among the central methods implemented in the accreditation process is benchmarking. This is a method of identifying the best practices of similar institutions or programs and comparing them with the institution or program being assessed. As Rothwell (1996) points out, benchmarking is "the search for industry best practices that lead to superior performance" (p. 116). Benchmarking is widely advocated and accepted across many fields to compare and contrast best practices to identify areas for improvement in

programs (Camp, 1998). Czarnecki (1998) observes that comparisons focus on key performance gaps, rallying support internally around findings to create consensus to move forward.

## Accreditation

Excellence in aerospace administration programs is an important aspect of the health of the national aviation industry. Accreditation has two fundamental purposes: (a) to ensure the quality of the institution or programs, and (b) to assist in the improvement of the institution or program (CAA, 2003). With accreditation, students are assured of receiving quality education and training, which prepare them for performing a broad range of professional responsibilities. Further, graduates are assured that their educational degree program has met desired industry standards. Although accreditation is a voluntary process, accrediting decisions are used as considerations in many formal actions by governmental funding agencies, scholarship commissions, foundations, employers, counselors, and potential students (CAA, 2003).

The CAA was recently recognized by the Council for Higher Education Accreditation (CHEA). CHEA is a private, nonprofit, national organization that coordinates accreditation activity in the United States. The Council represents more than 3,000 colleges and universities and 60 national, regional, and specialized accreditation associations (CAA, 2002).

North (1999) encourages university aviation departments to acquire aviation accreditation because traditional academic accreditation falls short of the specialized focus needed in the aviation industry. North also suggests that aviation industry representatives play an advisory role in universities to help faculty develop curricula of immediate and practical value to students who enter the industry.

Recruitment literature for students considering an airline career appears to show a bias toward accredited programs. The Airline Pilots Association (ALPA) specifically suggests that students who desire careers with airlines should seek out university aviation departments that have achieved accreditation from the CAA. To become a pilot or manager with an airline is an often stated goal of the vast majority of aviation students, and the ALPA recruitment brochure states that programs without CAA accreditation are at a distinct disadvantage for their graduates' acceptance into the industry (ALPA, 2002).

## Criteria of Excellence for Aerospace Administration Programs

Central to the present case study was the comparison of industry-recommended CAA curriculum requirements with ISU aerospace administration requirements. CAA requires that any accredited program's curriculum be designed to allow a graduate to function as an aviation professional (CAA, 2001). An aviation professional is one who uses the

knowledge gained for "the design, management and operation of safe, efficient, and comprehensive national and international aviation and aerospace systems" (p. 8).

Because of the broad scope of the aviation professional's duties, CAA mandates criteria addressing interdisciplinary studies that include general education, aviation core, aviation option, business management, and a capstone experience course (CAA, 2003). The program requirements for each of these are described below.

### *General education*

CAA recommends sequential coursework that culminates in advanced assignments. The purpose of this curriculum is to prepare students to be able to identify and solve problems. All programs must incorporate courses that require students to demonstrate mastery of written and verbal communications; mathematics, including calculus; science, including physics or chemistry appropriate to the level of aviation option pursued; and competence in computers. CAA requires 12 semester credits in this curriculum area (CAA, 2003).

### *Aviation core*

The program must have a foundation of essential as well as specialized knowledge of aviation systems. The purpose of this component is to ensure students' foundation in essential knowledge appropriate to the aviation degree. CAA requires 12 semester credits in this curriculum area. Topics may be addressed in entire courses or in portions of courses (CAA, 2003).

### *Aviation option*

This component supplies students with a coherent series of courses that provide specialized knowledge for preparation as aviation professionals. CAA approves the following baccalaureate degree option areas: (a) aviation management, (b) aviation electronics, (c) aviation studies, and (d) flight education. CAA requires 36 semester credits in this curriculum area (CAA, 2003).

### *Business management*

Because an aviation professional's duties encompass a wide range of knowledge, CAA specifics a number of business management courses for the aviation management program. These courses include the following: (a) accounting, (b) micro and macro economics, (c) finance, (d) management, (e) business law, and (f) human resource management (CAA, 2001). CAA requires 36 semester credits in this curriculum area (CAA, 2003).

### *Career focus*

Each institution has some flexibility in program design, but to meet the CAA standards, the curriculum must focus on a potential career field rather than provide a generalized extension of the aviation core area. Career focus

may address various industry areas, such as airport management, maintenance management, aviation management, or air carrier management. Each area should be developed with the assistance of industry representatives, appropriate industry associations, and professionals in the field.

Regardless of career focus, the aviation management option track requires a combination of business and aviation coursework. This track requires significant upper-level experience in aviation management, with a minimum of 3 semester credit hours. These may be fulfilled by a capstone course, an internship, or a special project that build upon prior coursework.

**Table 1. Four-year educational institutions with programs accredited by the Council on Aviation Accreditation, as of 2004**

| Institution | Year First Accredited | Year Most Recently Accredited |
|---|---|---|
| Arizona State University | 2000 | 2000 |
| Auburn University | 2003 | 2003 |
| Central Missouri State University | 1995 | 2001 |
| Daniel Webster University | 2001 | 2001 |
| Embry-Riddle Aeronautical University, FL | 1992 | 2001 |
| Embry-Riddle Aeronautical University, AZ | 1999 | 2001 |
| Florida Institute of Technology | 1992 | 2002 |
| Hampton University | 2002 | 2002 |
| Louisiana Tech University | 1993 | 2004 |
| Middle Tennessee State University | 1992 | 2002 |
| Parks College | 1996 | 2001 |
| Purdue University | 1998 | 2003 |
| Saint Cloud State University | 1994 | 2004 |
| University of Nebraska-Omaha | 2002 | 2002 |
| University of North Dakota | 1992 | 2002 |
| Utah State University | 2004 | 2004 |
| Western Michigan University | 2002 | 2002 |

Note. Of the 19 educational institutions accredited, 2 are two-year community colleges, Mercer County Community College, NJ, and North Shore Community College, MA, and are not listed here. Council on Aviation Accreditation (2004): http://www.caaaccreditation.org/programs.html

**Comparison with Other University Aerospace Administration Programs**

As of October 2004, CAA accredited aviation programs at 19 educational institutions in the U.S., 17 four-year programs and 2 two-year programs. These offer a variety of programs that include flight training,

aircraft maintenance, aircraft dispatch, air traffic control, and aviation management. Table 1 lists these institutions.

For the present study, detailed information was gathered from curriculum brochures listed on the Internet for analysis of four directly competitive CAA-accredited universities. These were Purdue University, Middle Tennessee State University, Central Missouri State University, and Saint Cloud State University (Table 2).

**Table 2. Overview of selected Council on Aviation Accreditation accredited educational institutions with aerospace administration or parallel programs**

| Institution and Program Title | Semester Hours |
|---|---|
| Central Missouri State University, Warrensburg, MO Aviation Management | 124 |
| Middle Tennessee State University, Murfreesboro, TN Aerospace Administration | 124 |
| Purdue University, West Lafayette, IN Aviation Administration | 128 |
| Saint Cloud State University, Saint Cloud, MN Aviation Management | 120 |

Source: Council on Aviation Accreditation (2004). Available at www.caaaccreditation.org/013102.htm.

A comparison reveals that not all of the institutions required the same coursework but each met the CAA requirements by various means. With regard to the general education requirement, each required courses in speech, English composition, business writing, computers, and some form of calculus. Additional CAA requirements were met through combined coursework.

With regard to the aviation core requirement, each required a basic flight course, current issues, aviation safety, and introduction to technology. In some cases, universities appeared to meet CAA requirements through combined coursework.

Additional aviation core coursework varied by institution, as did preparatory coursework. In addition, although many course options were available, no consistency was found among the institutions reviewed. It is possible that aviation core offerings varied because of availability of faculty to teach a specific class or series of classes.

With regard to the aviation option curriculum, each institution required complete coursework in one of the selected aviation option areas. These were the baccalaureate option areas listed above.

With regard to the business management curriculum, each institution required complete coursework in microeconomics, macroeconomics, introduction to accounting, managerial/cost accounting, and introduction to law. Several business-related courses were required by all of the reviewed

institutions, such as microeconomics, introduction to accounting, and statistics. Additional business management coursework varied by institution, as did preparatory coursework. As with other categories, although many class options were available, there was no substantial consistency among the institutions. It is possible that the institutions' business management offerings varied because of faculty availability or departmental problems in obtaining a course from the appropriate campus department, possibly because of specific course content required by CAA.

With regard to the CAA capstone requirement, each university used a different method of fulfillment. CAA allows some flexibility in this requirement, provided that coursework is addressed and documented within other course areas (CAA, 2004).

## Evaluations of Other Aerospace Administration Programs

Evaluations of aviation management programs for case study are sparse. However, Ruiz et al. (2000) surveyed 806 individuals who graduated from the aviation management program at Southern Illinois University Carbondale between 1985 and 1996. Graduates were asked for their perceptions of the usefulness of the program and evaluation of the program regarding their achievement of occupational and/or life goals.

Results for major courses in aviation management indicated that airline management and aviation maintenance management were considered the most valuable, and airport planning and general aviation operations were considered the least valuable. Recommendations based on results of this survey included a number of changes in the curriculum. At the time of article publication, changes were "under consideration or have been made to the . . . program" (Ruiz et al, 2000, p. 58). This study provided a model for the present case study, especially the survey of university graduates.

Flouris and Gibson (2002) conducted a similar study of 59 graduating seniors, focusing on aviation management job placement. Subjects surveyed were graduating from one of four major university aviation management programs. Results showed that the students were most interested in major airlines, regional airlines, fixed-based operations, and corporate flight departments. Students also indicated more interest in operations positions rather than staff responsibilities. Recommendations included adding internships for students to gain a more realistic view of career and workload responsibilities.

Graduates' and employers' ratings on important items varied considerably. For example, employers rated the candidate selection areas highest, such as ability to prioritize, plan, and organize, whereas graduates focused on medical insurance and retirement pension plans. Employers stressed the importance of the basic general education curriculum and favored communication, leadership, and computer skills, whereas graduates were more interested in operations (Flouris & Gibson, 2002).

Based on these results, Flouris and Gibson (2002) made several recommendations. Most important was better student preparation through a solid academic foundation that integrates general education and a comprehensive aviation core, such as programs accredited by the CAA. Also important was the recommendation that students engage in internships, capstone, or cooperative education opportunities to gain greater experience in the field before actual employment.

Prospective employers of aviation program graduates were surveyed by Kaps and Ruiz (1997). Thirty presidents of airline companies were asked what they felt students who are seeking an airline career should study. Results indicated that airline presidents placed the most value on courses stressing a better understanding of fiscal requirements, legal aspects, and airline operations. The presidents also stressed the importance of an understanding of operating in a global marketplace environment. Respondents placed less importance on airport planning, airport management, professional development, and general aviation operations.

Kaps and Ruiz (1997) also compared the importance of the CAA's recommended curriculum with the presidents' views on what a new aviation management graduate most needed. The CAA curriculum was used by Kaps and Ruiz as representative of the best criteria for comparing required courses to competencies necessary in the aviation industry. Results mirrored the previous comparisons: the importance of a solid business base was highlighted, coupled with intensive aviation studies, as outlined by the CAA. However, in both comparisons, Kaps and Ruiz (1997) found that the airline presidents rated airport management, general aviation, and aviation history low in importance compared to the other CAA recommended courses.

Thus, the case studies reviewed generally agree on the recommendation on student preparation for aviation careers. Each case study reflected high emphasis on a solid general education, with additional knowledge in aviation and business courses equally important, for graduates' employability in the industry.

## METHODOLOGY

### Survey Development

A cross-sectional survey design was used for this study. The survey was conducted from May to July 2003. Three groups of ISU-related individuals were surveyed: graduates of the program, current faculty, and current and potential employers in the state of Indiana. The survey was developed with reference to the literature and input and advice in aviation and education from ISU faculty and industry representatives. The final survey was divided into two main sections, the first on demographic information, and the second on the five aerospace administration competencies—general education,

aviation core, aviation option, business management, and aviation capstone. At the end of the surveys, respondents were invited to comment.

The surveys for the three groups varied slightly because items were customized. For example, the graduate survey included items on reason for selecting the aerospace administration degree program, demographic information, employment position, and salary levels. The faculty survey included items on demographic information, professional rank and teaching experience, and expert knowledge areas. The employer survey included items on demographic information, occupational category, position title, and comparisons of ISU graduates to graduates of other programs. All survey instruments asked respondents to rate the importance of aerospace administration competencies noted above. The graduate survey contained 43 items, the faculty survey contained 38 items, and the employer contained 40 items. For all three surveys, each item was scored on a Likert-type scale, from 1 indicating no importance to 5 indicating great importance.

Field-testing took place with a sample of 10 graduates, 5% of the total to be surveyed; 5 faculty members, 30% of the total; and 10 employers, 10% of the total. After revisions for clarity and consistency, the final survey, the Aerospace Administration Program Evaluation Survey (AAPES), was administered by the researcher to graduates, faculty members, and employers (see Appendix for sample survey).

## Administration of Surveys

Surveys were mailed to 204 graduates of ISU's aerospace administration degree program, 17 current faculty associated with teaching the aerospace administration degree program, and 100 actual and potential employers of graduates within the state of Indiana. The names of the graduate students were obtained from the ISU alumni office. The names of the employers were obtained from state aeronautics records. Follow-up mailings took place at 2 weeks. Responses were received from a total of 61 graduates (33% response rate), 17 faculty (100%), and 41 employers (41%).

## RESULTS

### Comparison of ISU Program with CAA Standards

The present ISU program fell short in each curriculum area when compared with CAA standards. In the general education curriculum, physics or chemistry and calculus requirements were lacking. In the aviation core area, although the program contained 16 credit hours, meeting the 12 credit hours minimum, this curriculum did not meet the CAA standards for aircraft systems, airspace, or meteorology.

**Table 3. Characteristics and responses to the Indiana State University Aerospace Administration Program Evaluation Survey, of respondents who are graduates of the program, 2003 (N = 66)**

|  | Number | Percent |
|---|---|---|
| 1. Highest degree held |  |  |
|     Bachelor | 65 | 98.5 |
|     Master | 1 | 1.5 |
| 2. Age |  |  |
|     24-26 | 10 | 16.2 |
|     27-30 | 14 | 21.2 |
|     31-35 | 33 | 50.0 |
| 3. Sex |  |  |
|     Male | 52 | 78.8 |
|     Female | 14 | 21.2 |
| 4. Ethnic background |  |  |
|     Caucasian | 62 | 78.8 |
|     African American | 1 | 1.5 |
|     Hispanic | 1 | 1.5 |
|     Asian | 1 | 1.5 |
|     Other | 1 | 1.5 |
| 5. Primary reason for selecting a degree from ISU Dept. of Aerospace Tech |  |  |
|     Federal government | 8 | 12.1 |
|     Local or authority government | 2 | 3.0 |
|     Airline pilot | 18 | 27.3 |
|     Airline management | 20 | 30.3 |
|     Airport management | 10 | 16.2 |
|     Air traffic control | 2 | 3.0 |
|     Military assignment/advancement | 1 | 1.5 |
|     Post-military education | 1 | 1.5 |
|     Salary advancement | 1 | 1.5 |
| 6. Your technology degree prepared you for first job |  |  |
|     Very well | 18 | 27.3 |
|     Adequately | 34 | 51.5 |
|     Poorly | 4 | 6.1 |
|     Not at all | 7 | 10.6 |
| 7. Current employment status |  |  |
|     Full-time employed | 56 | 84.8 |
|     Part-time employed | 2 | 3.0 |
|     Self-employed | 2 | 3.0 |
|     Armed Forces | 3 | 4.5 |
| 8. Current salary |  |  |
|     $20,000 to $29,999 | 7 | 10.6 |
|     $30,000 to $39,999 | 16 | 22.7 |
|     $40,000 to $49,999 | 7 | 10.6 |
|     $50,000 to $69,999 | 8 | 13.6 |
|     Greater than $70,000 | 14 | 21.2 |

**Table 3. Characteristics and responses to the Indiana State University Aerospace Administration Program Evaluation Survey, of respondents who are graduates of the program, 2003 (N = 66)** *(continued)*

|  | Number | Percent |
|---|---|---|
| 9. Occupational category that most closely describes your present job | | |
| Military | 6 | 9.1 |
| Federal government | 5 | 7.6 |
| Air carrier | 13 | 19.7 |
| Airport-based business | 1 | 1.5 |
| Aviation manufacturing | 2 | 3.0 |
| Airport | 4 | 6.1 |
| Corporate aviation | 2 | 3.0 |
| Self-employed | 2 | 3.0 |
| Other area in aviation industry | 10 | 15.2 |
| Employed outside of the aviation industry | 19 | 28.8 |
| 10. Skills essential for your current job* | | |
| Management skills | 36 | 29.0 |
| Oral communications | 32 | 26.0 |
| Written communication | 19 | 15.0 |
| Human relations | 15 | 12.0 |
| Mathematical skills | 12 | 10.0 |
| Human relations | 11 | 9.0 |

Total percentage exceeds 100% because of rounding.
* Top six skills indicated by subjects. Total number equals 125 because many graduates listed more than one skill.

The aviation option area did not exist as part of the aerospace administration degree. Thus, the program had only 18 credits hours of the 36 credit hours requirement. In the business management area, only one of the seven course areas met CAA standards. Finally, no requirement for a capstone course existed in the program, as required by CAA standards.

**Comparison of ISU Aerospace Administration Program with Similar CAA-Accredited Programs**

Detailed comparisons of the CAA-accredited programs at Purdue University, Saint Cloud State University, Central Missouri University, and Middle Tennessee State University compared with the ISU aerospace administration program revealed substantial gaps in each of the five competency areas. Each of the four reviewed universities has a well-defined general education curriculum that includes coursework in physics and calculus, an aviation core curriculum that includes coursework in aircraft systems and meteorology, an aviation option curriculum that includes career tracks in airline management and airport management, a business management curriculum with coursework in finance and marketing, and a

capstone requirement that includes coursework in internship and airport certification.

In comparison, at ISU, as noted, the general education curriculum lacked a physics or chemistry course and a calculus course. The aviation core curriculum lacked an airspace course and aircraft systems course. The present program also did not have a specific aviation option track. The business management track lacked accounting, finance, and marketing courses. The program did not have a capstone requirement. Thus, in comparison with the four programs at the CAA-accredited programs reviewed, the ISU aerospace administration program had many deficiencies.

## Results of the Aviation Administration Program Evaluation Survey for Graduate, Faculty, and Employer Respondents

### *Results of the survey of graduate respondents (AAPES-G)*

Table 3 shows the demographic composition and responses of the graduate sample (N = 66). Most graduates, 98.5% (n = 65), possessed a bachelor degree, followed by 1.5% (n = 1) with a master degree. The oldest group of graduates, 50.0% (n = 33), was 31 to 35 years old; followed by those between 27 to 30, 21.2% (n = 14); and those 24 to 26, 16.2% (n = 10). Most subjects were male, 78.8% (n = 52), with 21.2% (n = 14) female. Caucasian graduates were the largest group represented, 78.8% (n = 62), with 1.5% (n = 1) each African American, Hispanic, Asian, and Other.

The largest categories of graduates' reasons for selecting a degree from the ISU Department of Aerospace Technology were to pursue a career in airline management, 30.3% (n = 20); airline pilot, 27.3% (n = 18); airport management, 16.2% (n = 10); and the federal government, 12.1% (n = 8). The smallest categories were air traffic control, 3.0% (n = 2); and military assignment/advancement, post-military education, and salary adjustment, each 1.5% (n = 1).

When indicating how well the technology degree prepared them for their first job, 51.5% (n = 34) indicated that the degree prepared them adequately, followed by 27.3% (n = 18), who felt very well prepared. The smallest percentage of graduates felt they were not at all prepared, 10.6% (n = 7), and poorly prepared, 6.1% (n = 4).

Over four-fifths, 84.8% (n = 56) of the graduate respondents were employed full-time, with 4.5% (n = 3) reporting service in the armed forces. A total of 3.0% (n = 2) each indicated part-time employment and self-employment. The two largest income categories were $30,000 to $39,999, at 22.7% (n = 16), and greater than $70,000, 21.2% (n = 14). The next three largest income categories were $50,000 to $59,999, 13.6% (n = 8); and $20,000 to $29,900 and $40,000 to $49,900, each 10.6% (n = 7).

Graduate respondents indicated a variety of occupational categories. The four largest groups were employed outside of the aviation industry, 28.8% (n

= 19); air carrier, 19.7% (n = 13); other area in aviation industry, 15.2% (n = 10); and military, 9.1% (n = 6). Smaller categories are federal government 7.6 % (n = 5); airport, 6.1% (n = 4); and aviation manufacturing, corporate aviation, and self-employed, each 3.0% (n = 2). The smallest category of occupation was airport-based business, 1.5% (n = 1).

Graduate respondents selected six top skills considered essential for the current job. Management skills, 29.0% (n = 36), was the largest; followed by oral communications, 26.0% (n = 32); written communication; 15.0% (n = 19); human relations, 12.0% (n =15); mathematical skills, 10.0% (n = 12); and human relations, 9.0% (n = 11).

Table 4 shows the results of the curriculum competencies section of the AAPES-G. The mean for general education was 4.0 (SD 1.1), for aviation core 3.8 (SD 1.1), for aviation option 3.9 (SD 1.1), for business management 4.0 (SD 1.0), and for aviation capstone 4.2 (SD 1.0). For the total survey, the mean was 3.9 (SD 1.1). These means indicate that the graduate respondents felt that the items in the survey were between moderate importance and great importance for an excellent aerospace administration program.

**Table 4. Results of Indiana State University Aerospace Administration Program Evaluation Survey, for respondents who are graduates of the program, 2003 (N = 66)**

| Competency | Mean | Standard deviation | Range | Mean value |
|---|---|---|---|---|
| General Education | 4.0 | 1.1 | 16-29 (6-30) | 24 |
| Aviation Core | 3.8 | 1.1 | 17-57 (12-60) | 46 |
| Aviation Option | 3.9 | 1.1 | 0-20* (4-20) | 16 |
| Business Management | 4.0 | 1.0 | 0-30* (6-30) | 24 |
| Aviation Capstone | 4.2 | 1.0 | 0-5* (1-5) | 4 |
| Total Survey | 3.9 | 1.1 | 75-136 (29-145) | 114 |

Note. Means are based on scoring scales: 1 = No importance. 2 = Little importance, 3 = Moderate importance, 4 = Considerable importance, 5 = Great importance. Numbers in parentheses indicate total range possible.
* Actual minimum is 0 because some subjects did not respond to items within competency.

Additional comments from the graduate respondents reflected their feelings that the department needed to reinforce the present curriculum with additional requirements that would help future graduates of the program. This gap corroborates the deficient courses in business management compared to CAA standards. Graduates commented that this area offered them the least preparation to enter the workplace with confidence. Graduates recommended additional courses, including speech and writing, accounting,

public media relations, finance, and required student participation in internships.

### *Results of the survey to faculty respondents (AAPES-F)*

Table 5 shows the responses and demographic composition of the faculty sample. The majority, 58.8% (n = 10), possessed a master degree, and 41.2% (n = 7) a doctorate degree. The largest group of faculty members, 35.3% (n = 6), were ages 46 to 50, followed by those over 50, 29.4% (n = 5). Most faculty members were male, 76.5% (n = 13), with 23.5% (n = 4) female. Caucasian faculty members were the largest group represented, 88.2% (n = 15), with 5.9% (n = 1) each African American and Asian. A total of 47.1% (n = 8) of the faculty held a tenure-track position, and 47.2% (n = 7) held tenured positions. Only 11.8% (n = 2) held full-time temporary nontenure-track positions.

**Table 5. Characteristics and responses to the Indiana State University Aerospace Administration Program Evaluation Survey, respondents who are faculty of the program, 2003 (N = 17)**

| Characteristic | Number | Percent |
|---|---|---|
| 1. Highest degree held | | |
|     Doctorate | 7 | 41.2 |
|     Master | 10.5 | 58.8 |
| 2. Age | | |
|     46-50 | 6 | 35.3 |
|     More than 50 years | 5 | 29.4 |
| 3. Sex | | |
|     Male | 13 | 76.5 |
|     Female | 4 | 23.5 |
| 4. Ethnic background | | |
|     Caucasian | 15 | 88.2 |
|     African American | 1 | 5.9 |
|     Asian | 1 | 5.9 |
| 5. Employment status | | |
|     Full-time faculty member, tenured | 7 | 41.2 |
|     Full-time faculty member, tenure track | 8 | 47.1 |
|     Temporary full-time, nontenure track | 2 | 11.8 |
| 6. Occupational category | | |
|     Dept. of Aerospace Technology | 6 | 35.3 |
|     Dept. of Industrial Technology Education | 6 | 35.3 |
|     Dept. of Mfg and Construction Technology | 2 | 11.8 |
|     Dept. of Electronics and Computer Technology | 3 | 17.6 |
| 7. Current job title* | | |
|     Assistant Professor | 12 | 70.6 |
|     Professor | 2 | 11.8 |
|     Associate Professor | 1 | 5.9 |
|     Instructor | 1 | 5.9 |

Regarding faculty respondents' occupational categories, which reflect their teaching departments, 35.3% (n = 6) each were in the Department of Aerospace and the Department of Industrial Technology Education. A total of 17.6% (n = 3) were in the Department of Electronics and Computer Technology, followed by 11.8% (n = 2) in the Department of Manufacturing and Construction Technology. Over two-thirds, 70.6% (n = 12) were assistant professors, 11.8% (n = 2) were professors, and 5.9% (n = 1) each were an associate professor and instructor.

Table 6 shows the results of the curriculum competencies section of the AAPES-F. The mean for general education was 4.4 (SD 0.8), for aviation core 4.4 (SD 0.8), for aviation option 4.4 (SD 0.7), for business management 4.5 (SD 0.6), and for aviation capstone 4.6 (SD 0.5). For the total survey, the mean was 4.4 (SD 0.7). These numbers indicate that faculty respondents felt that the items in the survey were between considerable importance and great importance for an excellent aerospace administration program.

**Table 6. Results of Indiana State University Aerospace Administration Program Evaluation Survey, for respondents who were faculty of the program, 2003 (N = 17)**

| Competency | Mean | Standard deviation | Range | Mean value |
|---|---|---|---|---|
| General Education | 4.4 | 0.8 | 22-29 (6-30) | 2 |
| Aviation Core | 4.4 | 0.8 | 42-60 (12-60) | 53 |
| Aviation Option | 4.4 | 0.7 | 12-20 (4-20) | 18 |
| Business Management | 4.5 | 0.6 | 21-30 (6-30) | 27 |
| Aviation Capstone | 4.6 | 0.5 | 4-5 (1-5) | 5 |
| Total Survey | 4.4 | 0.7 | 108-143 (29-145) | 128 |

Note. Means are based on scoring scale: 1 = No importance, 2 = Little importance, 3 = Moderate importance, 4 = Considerable importance, 5 = Great importance.
Numbers in parentheses indicate total range possible.

Some of the faculty respondents added written comments. These reflected feelings that the present curriculum was deficient and additional courses should be added to help future graduates prepare for industry employment. Examples of such reinforcement include student participation in internships, research project, or industry certification. Most faculty respondents felt the department's coverage of the general education, business management, and aviation option coursework appeared to be satisfactory, although not all respondents agreed.

### Results of the survey of aviation employers (AAPES-E)

Table 7 shows the demographic composition of the employer sample (N = 41). Most employers, 58.5% (n = 24) possessed a bachelor degree, followed by 17.1% (n = 7), with a master degree. The largest group of

employers, 36.6% (n = 15), was more than 50 years old, followed by those between 41 and 45, 17.1% (n = 7); and 36 to 40 and 46 to 50, each with 4.6% (n = 6). Most subjects were male, 70.7% (n = 29), with 29.3% (n = 12) female. Caucasian employers were the largest group represented, 95.1% (n = 39), with 2.4% (n = 1) African American. Over four-fifths, 87.8% (n = 36) were employed full-time, with those employed part-time 7.3% (n = 3). Employers indicated a variety of occupational categories. The four largest were airport, 48.8% (n = 20); airport-based business, 12.2% (n = 5); employed outside of the aviation industry, 9.8% (n = 4); and other area in aviation industry, 7.3% (n = 3). A total of 4.9% (n = 2) each were in the federal government, air carrier, and corporate aviation. The smallest category of occupation was that of self-employment 2.4% (n = 1). Almost the majority, 43.9% (n = 18), had been in their position for 1 to 5 years; followed by 17.1% (n = 7) for 6 to 10 years; and 14.6% (n = 6) more than 20 years.

Almost three-fourths, 73.2% (n = 30) did not employ any ISU graduates. A total of 7.3% (n = 3) employed four or more ISU graduates, and 2.4% (n = 1) each employed two and three ISU graduates. When asked to compare ISU graduates to other university graduates, 61.0% (n = 25) of the employers indicated that no ISU graduates were employed. A total of 17.1% (n = 7) indicated ISU graduates were about the same as those from other universities, and 9.8% (n = 4) indicated ISU graduates were better than some. The smallest category, 4.9% (n = 2), indicated ISU graduates were better than most.

**Table 7. Characteristics and responses to the Indiana State University Aerospace Administration Program Evaluation Survey, of respondents who were actual and potential employers within the state of Indiana of graduates of the program, 2003 (N = 41)**

| Characteristic | Number | Percent |
|---|---|---|
| 1. Highest degree held | | |
|     Bachelor | 24 | 58.5 |
|     Master | 7 | 17.1 |
| 2. Age | | |
|     36-40 | 6 | 14.6 |
|     41-45 | 7 | 17.1 |
|     46-50 | 6 | 14.6 |
|     More than 50 years | 15 | 36.6 |
| 3. Sex | | |
|     Male | 29 | 70.7 |
|     Female | 12 | 29.3 |

Table 7. Characteristics and responses to the Indiana State University
Aerospace Administration Program Evaluation Survey, of respondents who
were actual and potential employers within the state of Indiana of graduates of
the program, 2003 (N = 41) *(continued)*

| Characteristic | Number | Percent |
|---|---|---|
| 4. Ethnic background | | |
|   Caucasian | 39 | 95.1 |
|   African American | 1 | 2.4 |
| 5. Current employment status | | |
|   Full-time Employed | 36 | 87.8 |
|   Part-time Employed | 3 | 7.3 |
| 6. Occupational category* | | |
|   Federal government | 2 | 4.9 |
|   Air carrier | 2 | 4.9 |
|   Airport-based business | 5 | 12.2 |
|   Airport | 20 | 48.8 |
|   Corporate aviation | 2 | 4.9 |
|   Self-employed | 1 | 2.4 |
|   Other area in aviation industry | 3 | 7.3 |
|   Employed outside aviation industry | 4 | 9.8 |
| 8. Years in present position | | |
|   1-5 years | 18 | 43.9 |
|   6-10 years | 7 | 17.1 |
|   11-15 years | 5 | 12.2 |
|   16-20 years | 4 | 9.8 |
|   More than 20 years | 6 | 14.6 |
| 9. Number of ISU graduates currently employed by firm | | |
|   0 | 30 | 73.2 |
|   2 | 1 | 2.4 |
|   3 | 1 | 2.4 |
|   4 or more | 3 | 7.3 |
| 10. Assessment of ISU graduates compared to other university graduates | | |
|   No other graduates employed | 25 | 61.0 |
|   About the same | 7 | 17.1 |
|   Better than some | 4 | 9.8 |
|   Better than most | 2 | 4.9 |

Note. Numbers of characteristics follow numbers of items in Aviation Administration Program
Evaluation Survey—Employers (AAPES-E)
* Titles are collapsed for brevity.

Based upon industry experience, employers also provided written
comments about the present ISU aerospace administration program. Most
employers felt the curriculum was lacking in a number of components
essential for successful employment. Employers suggested additional
courses such as speaking and people skills, marketing, writing, finance, and
required student participation in internships.

Table 8 shows the results of the curriculum comparisons of the AAPES completed by the employers. The mean for general education was 4.1 (SD 1.0), for aviation core 4.0 (SD 0.9), for aviation option 4.0 (SD 0.9), for business management 4.0 (SD 0.9), and for aviation capstone 4.3 (SD 1.0). For the total survey, the mean was 4.0 (SD 0.9). These means indicate that employer respondents felt that the items in the survey were between considerable importance and great importance for an excellent aerospace administration program.

**Table 8. Results of Indiana State University Aerospace Administration Program Evaluation Survey, for respondents who were actual and potential employers within the state of Indiana of graduates of the program, 2003 (N = 41)**

| Competency | Mean | Standard deviation | Range | Mean value |
|------------|------|--------------------|-------|------------|
| General Education | 4.1 | 1.0 | 18-30 (6-30) | 24 |
| Aviation Core | 4.0 | 0.9 | 37-60 (12-60) | 48 |
| Aviation Option | 4.0 | 0.9 | 10-20 (4-20) | 16 |
| Business Management | 4.0 | 0.9 | 12-30 (6-30) | 24 |
| Aviation Capstone | 4.3 | 1.0 | 0-5* (1-5) | 4 |
| Total Survey | 4.0 | 0.9 | 96-141 (29-145) | 117 |

Note. Means are based on scoring scales: 1 = No importance, 2 = Little importance, 3 = Moderate importance, 4 = Considerable importance, 5 = Great importance. Numbers in parentheses indicate total range possible.
*Actual minimum is 0 because some subjects did not respond to items within the competency.

### Results of UAA audit of the ISU Department of Aerospace Technology

In the fall of 2002, the ISU department chairperson requested an independent audit by the UAA of the entire department, including reviews of curriculum programs, facilities and equipment, contractor operations, and faculty with particular interest and evaluation on the aerospace administration program. This was the first external agency review of the department since 1992 and the first review ever conducted by an aviation organization. In the spring of 2003, the UAA audited the aerospace department and provided a report that corroborated the underlying problem identified in this study (University Aviation Association, 2003).

Table 9 displays the curriculum areas reviewed by the UAA audit. Except for the aviation option area, all evaluated areas fell short of CAA standards. Within the general education curriculum, the audit noted that ISU must add both calculus and physics to meet the CAA standards. The audit also noted that since the aerospace administration program lacked any cohesive management content courses, the program should more appropriately be termed an aviation studies program rather than an administration or management program. The audit team specified that for the

aerospace administration program to meet CAA standards, addition of a comprehensive list of management content courses would be needed.

**Table 9. Selected results of University Aviation Association audit of Indiana State University Aerospace Administration Program, 2002**

| Aerospace Administration | Competency Met | Noted |
|---|---|---|
| General Education Curriculum | No | Lack of calculus Lack of physics |
| Aviation Core Curriculum | Yes | |
| Aviation Option Curriculum | Unknown | Not reported Lack of any management content courses |
| Business Management Curriculum | No | Lack of segment |
| Aviation Capstone Curriculum | No | focus |

Source: University of Aviation Association. 2003. *Indiana State University: Department of Aerospace Technology Audit Report.* Auburn, AL: University Aviation Association Press.

## DISCUSSION

As this case study demonstrated, to achieve CAA accreditation a program must meet specialized accrediting criteria and standards. Programs that have been awarded CAA accreditation are recognized to have achieved a high level of quality. The results of the present study, as determined by comparisons with CAA standards, a detailed program review, survey results, and a UAA audit visit, demonstrated substantial gaps between ISU's aerospace administration program and the industry-recommended standards of CAA.

**The Surveys**

Graduates, faculty, and employers responded similarly with regard to the contents necessary for an excellent aerospace administration program, as indicated by the means for each group: graduates, 3.9; faculty, 4.4; and employers, 4.0. These means show that all three groups rated the items in all competencies from moderate to considerable importance for incorporation into an excellent aerospace administration program.

*Graduate survey*

In the curriculum areas of the survey, the graduate respondent means for all five curriculum areas were between 3.9 and 4.2, with aviation capstone, general education, and business management the highest (see Table 4). The overall mean was 3.9, indicating that all areas were of moderate to considerable importance to graduates for an excellent program.

These results corroborate those of the program review, in which business management and capstone CAA requirements were severely

lacking in the ISU aerospace administration program. The program, in fact, had no capstone experience. These results indicate that graduates recognized the importance of strength in these curriculum areas for substantial employment preparation.

### Faculty survey

Faculty respondent means for all five curriculum areas were slightly higher than graduate respondents' means; between 4.4 and 4.6, with the highest means also for business management and capstone (see Table 6). The faculty total mean was 4.4. This mean indicates that faculty respondents evaluated all coursework specified as of considerable to great importance in an excellent aerospace administration program.

### Employer survey

The employer respondent results were also similar; their means were between 4.0 and 4.3, with general education and capstone the highest (see Table 8). The overall means was 4.0, comparable to the ratings of the other two groups. Thus, the employer respondents' mean indicates that they evaluated all coursework specified as of considerable to great importance in an excellent aerospace administration program.

Thus, graduates, faculty, and employers all rated CAA-required curriculum components similarly, with regard to both individual curriculum areas and overall means. These results imply the strong support by all groups for the revision of the present ISU aerospace administration program.

Qualitative feedback also supported these results. Graduate respondents commented most on the business management curriculum, stating that the addition of accounting, marketing, and public relations would improve the program. Some remarked that the aerospace administration program needed to raise its standards so that graduates would enter the workforce better prepared.

Faculty respondents commented that the most glaring omission was the capstone course requirement. One faculty respondent even suggested that the program should be elevated to a master degree program, suggesting that most students could not secure administrative positions in aviation without advanced training.

Employer respondents commented that additional emphasis should be placed on speaking and briefing skills as well as addition of a capstone experience. Employers respondents provided the most specific advice of the three groups, suggesting that more interpersonal and leadership skills courses should be developed and required within the business management.

**The UAA Audit**

Results of the site visit by the UAA audit team in May 2003 further corroborated the gaps identified in the present aerospace administration program and the need for program revision. The report noted within the general education curriculum the lack of required physics and calculus courses. In addition, although the report stated that the aviation core curriculum appeared to meet CAA standards, the auditors also noted that they had not completed a course matrix that would verify compliance with CAA standards.

Further, the team observed that because the present program does not contain a specific aviation option, that area could not presently meet CAA standards and therefore the option could not be evaluated. As a result, the program also does not meet the CAA capstone requirement. In support of the survey results, the UAA audit was the most critical of the present business management coursework, noting that the program lacked cohesive business management focus.

Thus, the results of survey respondents and the UAA audit report provide concurrent evidence that the present aerospace administration program shows major gaps in essential aviation curriculum, and that extensive revision is warranted. Especially in conjunction with the reviews of aviation programs at competitive universities, these findings suggest the basis for the steadily declining enrollment at ISU.

**Significance of the Study**

Based on the study results, five implications are evident. First, the present aerospace administration program does not meet current industry standards as determined by the literature review, comparisons with other universities, CAA standards, and surveys completed by graduates, faculty, and employers. This gap indicates one possible reason for the aerospace administration program's history of declining enrollments.

Second, unless the curriculum is revised, the department could experience continued loss of enrollments in the aerospace administration program.

Third, without revision, the current and future aerospace administration graduates will not meet industry expectations. Thereby, both the department and its graduates will be at a competitive disadvantage. Revision of the current curriculum would almost certainly place the program at a more competitive market advantage.

Fourth, if the department elects to revise the program to meet CAA standards, the program should then meet current industry standards. Such a revision, with proper marketing and recruitment efforts, would likely reverse the trend of declining enrollments.

Fifth, if the department considers accreditation, the study results and recommendations should provide a curriculum blueprint for the required changes necessary. These curriculum changes would reduce the timeline necessary to complete the CAA-directed self-study as part of the accreditation process.

A decision to pursue CAA accreditation was not considered as part of the present study, and no support for such effort from the respondents was requested. However, as demonstrated in this study, the CAA standards are recognized as valid criteria as judged by the formative and summative committees, industry, as well as the respondents of the survey instrument completed for the present research.

## RECOMMENDATIONS

A number of recommendations stem from the study findings. First, within the ISU aerospace technology department, the curriculum committee should receive a report of the findings so as to consider extensive revision of the aerospace administration degree program.

Second, the department should pursue CAA accreditation, beginning with a CAA self-study. This self-study would consider and incorporate the curriculum recommendations stemming from this study.

Third, based on the gaps identified in the UAA report, the department should utilize UAA for future department external audits. The UAA audit process was an effective method of gaining an outside perspective on the status of the department and especially the aerospace administration program.

Study results prompt several directions for further research. First, for greater insight into appropriate revision of the aerospace administration program, a study of graduates' occupations compared with the skills they most valued in the program should be conducted. Second, with curriculum revisions in place, a follow-up AAPES of recent graduates after they have been employed for 1-2 years should take place. Replication and comparison with present study results would show effectiveness of the revisions and provide assessment of the program's improvements and its adequacy in preparing students for employment in the aviation industry.

Third, this study surveyed 100 aviation employers, specifically airport managers or individuals directly supporting them, such as operations staff, security, and airport consultants in Indiana only. To enlarge the scope of the employer's responses, the study should be replicated with a larger number of employers to include air carrier managers both in and out of the state.

Fourth, a similar study should be conducted of the department's other degree program in professional aviation flight technology. The present research appears to have been the most comprehensive undertaken of the aerospace administration program, and results indicate a substantial revision

to the aerospace administration program. A parallel study of the professional aviation flight technology degree program could yield similar valuable results.

It should be noted that examination and evaluation such as those conducted in this study might produce considerable uneasiness and concern within departments, since previous policies, procedures, and decisions become open to scrutiny. For the present study, much lively debate and even disagreement accompanied the data gathering and review of information. Nevertheless, even with strong programs not subject to declining enrollment, periodic evaluations can helpful for currency and revitalization.

With additional goals such as accreditation, program reviews become even more important. The present study was undertaken as a first step toward the goal of accreditation, as well as to strengthen the aerospace administration program. Through examination of CAA standards, comparisons with competitive universities, surveys of significant groups, and a professional audit, the study demonstrated that the present ISU aerospace administration program requires extensive revision in highly specific curriculum areas. These findings have been shared with the university administration, and the process has been initiated for ISU to offer an excellent aerospace administration curriculum that meets industry standards and thoroughly prepares its graduates for responsible employment in aviation. Other universities and departments of aviation may find the procedures described here useful for comprehensive evaluation of their aviation curricula toward substantial improvement and industry accreditation.

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