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The Status of Women Faculty in Four-Year Aviation Higher Education Programs

David C. Ison

The purpose of the study was to evaluate the status of women's participation in full-time, non-engineering aviation baccalaureate programs in the United States. In addition, the involvement of women in academic aviation leadership positions (such as chair, dean, or director) was evaluated. Of 353 full-time aviation faculty members employed at 60 different aviation programs meeting the study's criteria, 36 (10.1%) were female. Eighty faculty were identified in academic leadership positions, and of these faculty leaders, 8 (10%) were women. These participation rates were found to be slightly higher than those found among the pilot population and in the aviation industry in general. The level of women's involvement in aviation higher education has increased in comparison to the findings of four out of five previous studies on this subject and has remained stable.

Introduction

Since World War II, the number of women in the U.S. workforce has increased significantly (University of Arizona, 1999). The U.S. Department of Labor (2006) reported that women comprise 46% of the American workforce. The 2003 data released by the U.S. Department of Education (2005a) reported that women made up 39.3% of higher education faculty compared to the 37.2% reported in 1999 (U.S. Department of Education, 2001). The aviation industry has also shared in the increase in women participation, albeit on a much smaller scale. The Federal Aviation Administration (FAA) (2006a) reported that although the number of total pilots has decreased during the past ten years, the number of women pilots has increased during the same period. Concurrently, the quantity of professional-level (airline transport pilot or ATP) certificated female pilots has also been on the rise (FAA, 2006a). Further, more women enroll in collegiate aviation programs now than ever before (U.S. Department of Education, 1995; U.S. Department of Education, 2005b).

Bowen (1990) suggested that the percentage of women pilot certificate holders closely matched the percentage of aviation faculty (p. 16). Therefore, the question remains, have these gains in aviation participation by

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women translated to similar gains in their membership among aviation higher education faculty? Have women successfully gained access to advanced positions in aviation departments, such as chair or dean? These factors are of particular concern, as the leadership and mentoring provided by women aviation faculty benefit the recruitment and retention of female students and fellow female aviation faculty (Luedtke, 1993, p. 78). This support structure is overtly an essential component of sustaining and increasing the number of women in the aviation industry.

Background of Women in Aviation

Since the first female pilot flew an airplane in 1908, the number of women in the world of aviation has gradually increased (Women in Aviation International, n.d.). Soon after this initiation, women did more than simply fly aircraft—they began to design aircraft (1906), break records (1911), deliver mail (1918), perform aerobatics (1915) and even repair aircraft (1925) (Woman in Aviation, n.d.) Women entered the commercial airline world in 1934 when the first female airline pilot was hired (International Social Affiliation of Women Airline Pilots, n.d.). The World War II era offered many opportunities to women. In the late 1930's and early 1940's, women began to enter aviation education as flight instructors (St. Louis Public Library, n.d.; Public Broadcasting Service, 2007). Nineteen forty-two marked a year of many firsts for women in aviation. In this year, the first woman air traffic controller was employed, and many women were enlisted to ferry military aircraft, e.g. in the famous squadron of Women Air Force Service Pilots (WASPs), to assist in the war efforts. By 1964, women had flown around the world and been into space. In 1973, a modern jet transport hired the first woman Airline Transport Pilot (ATP). A year later, women were officially permitted to be military pilots (Women in Aviation, n.d.).

By 1997, the aggregate number of pilots was 616,342 (FAA, 2006a). Women totaled 34,460, 5.6% of all pilots (FAA, 2006b). Airline Transport Pilots certificated pilots numbered 130,858 of which 2.7%, or 3,572, were women (FAA, 2006b). In 2006, the FAA (2006a) indicated that the number of certificated pilots was 597,109. Six percent of these pilots, or 36,101, were reported to be female (FAA, 2006b). Female ATP certificated pilots numbered 5,071, or 3.5% of ATP holders (FAA, 2006b). From 1997 to

Table 1
Changes in the Number of Total Pilots vs. Changes in the
Number of Women Pilots: 1997 to 2006.

| | 1997 | 2006 | Change |
|--------------|---------|---------|--------|
| Pilots | 616,342 | 597,109 | -3.2% |
| Women Pilots | 34,460 | 36,101 | 4.8% |
| % of Pilots | 5.6% | 6.0% | 0.4% |

2006, the number of women pilots increased 4.8% while the number of women ATP holders increased 41.9%. Considering that the primary use of the ATP certificate is to fly large, sophisticated aircraft, this is an encouraging statistic in terms of the quantity of females occupying well sought-after flying positions.

The growth in the number of women in aviation has not been limited to piloting. According to *Aviation Week and Space Technology* (2002), "the number of women in the [aviation] industry is growing steadily, if not dramatically." According to Turney, Bishop, Karp, Niemczyk, Sitler, and Green (2002), women will comprise a significant component of the future growth in the aviation industry (p. 70). Yet the distribution of women has been uneven within the aviation industry. The demographics of the flight attendant population historically has been predominately women so it should be no surprise that when the FAA began tracking the numbers of individuals in 2005, it was found that 80.4% were women (FAA, 2006a; FAA, 2006b).

However, there have been definite, though small, increases in the number of women in other areas of the aviation workforce. In non-maintenance positions such as ground instructor, aircraft dispatcher and flight engineers, the participation by women has grown from 5.5% in 1997 to 7% in 2006 (FAA, 2006a; FAA, 2006b). Even as the non-pilot aviation positions (excluding flight attendants) decreased from 540,892 in 1997 to 521,353 in

Table 2
Changes in the Number of Total ATP Certificate Holders vs. Changes in the
Number of Women ATP Certificate Holders: 1997 to 2006.

| | 1997 | 2006 | Change |
|-------------------------------|---------|---------|--------|
| ATP Certificate Holders | 130,858 | 141,935 | -8.5% |
| Women ATP Certificate Holders | 3,572 | 5,071 | 41.9% |
| % of ATP Certificate Holders | 2.7% | 3.6% | 0.9% |

Table 3
Total Non-Pilot Aviation Workers vs. Women Non-Pilot Aviation Workers:
1997–2006.

| | 1997 | 2006 | Change |
|----------------------------------|---------|---------|--------|
| Non-Pilot Aviation Workers | 540,892 | 521,353 | -3.6% |
| Women Non-Pilot Aviation Workers | 14,562 | 19,633 | 34.8% |
| % of Non-Pilot Aviation Workers | 2.7% | 3.8% | 1.1% |

2006, the numbers of women in these positions grew from 14,562 (2.7%) to 19,633 (3.8%) respectively (FAA, 2006a; FAA, 2006b).

Female Collegiate Aviation Student Numbers

The advancement of women in aviation has also occurred in the collegiate setting. In 1995, 373 (10.8%) graduates from four-year collegiate aviation programs were women (U.S. Department of Education, 1995). This number increased to 545, or 11.7%, by 2005 (U.S. Department of Education, 2005b). Although the improvement in participation may not appear impressive in light of the fact that total aviation program graduates increased 34.4% from 3,454 to 4,644, it is encouraging that the number of women in aviation programs continues to increase (U.S. Department of Education, 1995; U.S. Department of Education, 2005b). What is most exciting about these numbers is that the percentages of students exceed the percentages of the current women pilot population. This bodes well for the future of women in aviation in two potential ways. One is that a certain percentage of students will become pilots while the remaining individuals will pursue other jobs in aviation. With more women studying aviation, a potential to boost the quantity of women pilots exists.

Women in Higher Education Faculty Positions

The number of women faculty in higher education has been increasing at a marked pace. The 1993 National Study of Postsecondary Faculty (NSOPF) reported the percentage of women in higher education faculty positions was 38.6%. By 2004, female aviation faculty increased to 42.5% (National Center for Education Statistics [NCES], 2004). The rise in the number of women receiving doctoral degrees has influenced this trend. Smallwood (2006) reported, "For the fourth year in a row, the majority of U.S. citizens earning doctorates were women" (p. A12). With the rising percentages of women pilots, collegiate aviation students, and higher education faculty members, it is of particular interest to determine if the same gains have been made among the aviation higher education faculty membership.

Women in Aviation Higher Education Faculty

Data on the status of women collegiate aviation teaching positions with the most recent statistics available was collected in 1999. Johnson (1999) found that from a sample of 56 aviation faculty members only 4 (7.1%) were women. In a previous study by Johnson (1993), of 79 aviation faculty, 5 (6.4%) were women. In 1997, Johnson reported 1 (1.3%) woman among 75 faculty positions. In a larger study ($n = 237$), Luedtke (1993) discovered 25 (10.5%) women aviation faculty members. Bowen (1990) conducted the largest study ($n = 481$), which indicated that 25 (5.2%) aviation faculty members were women.

Both Bowen (1990) and Luedtke (1993) attributed the discrepancies in the participation rates between male and female aviation faculty to the low numbers of women pilots and few numbers of women pursuing advanced degrees in aviation-like fields, namely the sciences and engineering. No Ph.D. in aviation exists in 2008. Yet these arguments are less compelling in 2008. As previously mentioned, the number of women pilots continue to grow. More significantly, women are now earning more doctoral degrees in science and engineering fields. The National Science Foundation (2006) reported that women earned 38% of science and engineering doctoral degrees in 2003 compared to the 8% awarded in 1966. Further, the number of women collegiate aviation students was never taken into consideration. As the numbers of these individuals have risen, it should be expected for this to favorably influence the number of women aviation faculty members.

The importance of women aviation faculty cannot be underestimated. Luedtke (1993) noted the critical nature of female aviation faculty as leaders and supporters for future generations of women aviation professionals (pp. 81–82). Turney, et al. (2002) reported that women aviation college students have increased confidence and more favorable educational experiences with of female faculty (p. 75). Other studies have shown that classrooms are positively influenced by diverse faculty mentors (Umbach, 2005; Brinson and Kottler, 1993). A diverse faculty has also been shown to improve the retention and success of neophyte professors from underrepresented groups, which contributes to faculty diversity (Willdorf, 2000).

This presents a precarious situation for the future of women in aviation. In order to encourage, lead, and mentor young women to become aviation professionals, more female aviation faculty are necessary. Thus, it is paramount that trends in the numbers of women aviation faculty members are tracked and analyzed. The number of women faculty in aviation program leadership positions, i.e. chair or dean, has yet to be investigated. The presence of women in these capacities will likely support fellow female aviation faculty as well as women students. Considering that three out of the five studies completed on the subject had relatively small samples and all five studies are at least eight years old, broader and more current data are needed to evaluate the status of women aviation higher education faculty.

Methodology

Purpose

The purpose of this study was to quantify the number of full-time women aviation faculty in collegiate aviation baccalaureate degree programs in the United States to attain updated participation data and to evaluate any changes that have occurred since previous studies. The numbers of women in aviation program leadership positions were gathered to further evaluate the status of women in aviation higher education as well as to provide baseline data for future studies in this area.

Participants

The target population for this study was full-time aviation faculty who are employed at a baccalaureate collegiate aviation program. For the purposes of this study, the designation of “full-time aviation faculty” included only those fully-appointed (non-adjunct/non-visiting) faculty who teach non-engineering related subjects, e.g. aviation management, aeronautical science, airway science, air traffic control, and meteorology. Specifically excluded from this study are aircraft mechanic faculty and flight operations personnel (flight instructors and flight operations administrators). In addition, faculty members working in associate degree and certificate programs were excluded.

A sample of aviation schools was gathered from the University Aviation Association (UAA) *Collegiate Aviation Guide*. Although this publication is “a comprehensive guide of regionally accredited colleges and universities [. . . and] contains listings of institutions throughout the United States” (UAA, 2003), the sample collected from the guide may not represent all U.S. collegiate aviation programs. All of these selection criteria and procedures were selected to echo those used in previous studies in this area by Bowen (1990), Luedtke (1993), and Johnson (1993, 1997, and 1999).

Procedure

The websites of programs fitting the parameters of the study were reviewed and mined for faculty data. This data collection method was selected as the least intrusive in pursuing sensitive data on gender. In addition, reliance on responses from program directors and/or faculty was eliminated. This method assured a large sample of data. Little difficulty occurred in identifying genders of faculty members through the methodology. In a few cases, more information was necessary to confirm faculty gender, which was found through an additional search of the particular school’s website. Three specific items were collected from each site. The total number of full-time aviation faculty members was captured; the gender of each of faculty member was identified; and women faculty members who held the program director, chair, dean positions or equivalent were noted.

Results

Data collected from 60 baccalaureate institutions yielded information on 353 full-time aviation faculty members. Of these faculty members, 36 (10.1%) were female. The average distribution of faculty per school was 5.88, with 5.28 male faculty and 0.6 female faculty per school. Further analysis indicated that 80 faculty members were identified in an academic leadership position such as chair, dean, or program director. Among these faculty leaders, 8 (10.0%) were women.

Discussion

Within aviation, the percentage of women has historically been low. With 6.0% of female pilots and between 3.8% and 7.0% of female non-pilot aviation workers, it is not surprising that the percentage of women aviation faculty is similarly low. However, the data show that women occupy approximately 10% of aviation faculty positions. This participation rate is higher than within the industry in general. Furthermore, the participation rate of women among aviation faculty appears to be on the rise in comparison to the Johnson (1993, 1997, and 1999) and Bowen (1990) studies while remaining relatively stable in comparison to Luedtke's findings (1993). When coupled with the increase in the numbers of women pilots and non-pilots during the past 10 years, these findings are encouraging. Women are participating more across the spectrum of the aviation industry. It is also encouraging that the percentage of women in aviation academic leadership positions (10.0%) closely matched that of the percentage of aviation women faculty (10.1%).

However, in comparison to the participation rates of women among college faculty in general, the findings are not impressive. With 39% of new doctorates awarded in science and engineering and more than half of doctorates in remaining areas of studies earned by women, a 10.1% participation rate of women among aviation faculty is lagging behind other disciplines in higher education. Such statistics need to be placed in perspective in relation to the aviation industry. A more realistic expectation is participation rates similar to the percentages found among graduates in the specific field of study and of those within the industry. Considering that women occupied 11.7% of aviation program graduates, 6.0% of pilots and 3.8% to 7.0% of non-pilot aviation positions, the 10.1% participation rate of women among aviation faculty is reasonable.

Yet even with low representation in aviation, women have continued to increase in numbers throughout the industry, albeit slowly. The climbing numbers of women pilots, non-pilot aviation workers, and aviation college students all point to a growing trend of increasing participation by women. Although there is a need for further improvement, the rise in women involvement in aviation is a testament to the efforts throughout the industry to recruit and retain a more diverse workforce. The proportion of women

aviation faculty exceeding participation rates found in other parts of the industry is because of such efforts. Further optimism emerges from the involvement of women in aviation academic leadership. Again, there is room for improvement, despite the fact that women are working in rate capacities similar to their general faculty participation is promising.

Summary

The purpose of this study was to investigate the status of women faculty in aviation higher education. Women currently occupy 10.1% of full-time faculty positions in baccalaureate aviation programs. Furthermore, women hold 10.0% of aviation higher education leadership positions at such institutions. These rates of participation exceed those found in other parts of the aviation industry where women occupy only 6.0% of pilots and 3.8% to 7.0% of non-pilot aviation positions.

Some caution is in order when interpreting the historical and current levels of women participation in aviation, however. Although the trends in the status of women faculty in aviation higher education are positive, the overall women participation rates in aviation are still disappointing. It is ever more important to encourage and to support women aviation faculty so they may assist in teaching and mentoring and serve as models for future women aviation professionals. Moreover, such policies must be fostered in order to encourage women to move into the aviation professorate.

Recommendations

The findings of this study shed light on the status of women faculty in aviation higher education. Although women are making deliberate strides in the aviation industry and in aviation higher education, it is critical to retain and amplify the factors that have made this possible. Based upon these observations, the following recommendations are offered.

- Continue efforts to recruit, mentor, and retain women aviation students.
- Continue efforts to recruit, mentor, and retain women aviation faculty.
- Encourage women aviation students to pursue careers in aviation academia.
- Monitor the status of women faculty in aviation higher education with follow-up studies to include more statistics of women in aviation. Studies could include the numbers of women working in management, airport operations, and air traffic control.
- Conduct a study on the distribution of the academic ranks of aviation faculty to identify disparities between male and female faculty.
- Conduct a study that details the pathways and obstacles women aviation faculty endured to get to their current positions.

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