REIMAGING THE UNITED STATES AIRLINE INDUSTRY BY INCREASING FEMALE AVIATION MAINTENANCE TECHNICIANS

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Title of Study: REIMAGING THE UNITED STATES AIRLINE INDUSTRY BY INCREASING FEMALE AVIATION MAINTENANCE TECHNICIANS

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Abstract:

This study examined if there was an agreement between United States universities, colleges, or technical schools' aircraft maintenance female AMT students and the United States Bureau of Labor Statistics concerning the underrepresentation of female AMT at United States airlines. The study inquired if these institutions were aware of the female AMT underrepresentation at United States airlines and if these institutions identified solutions to close the disparity between male/female AMT. This study's long-term goal is to identify/resolve issues linked to the gender disparity among AMTs to better represent women as licensed airline mechanics in the United States. The data collected from program directors/faculty at ten participating universities, colleges, and technical schools were analyzed for the results and conclusions of this research study. The findings may help increase the presence of female AMTs in aviation maintenance technology programs which could help alleviate the present AMT shortage felt at airlines in the United States.

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CHAPTER I

INTRODUCTION

Currently, 160,000 qualified aviation maintenance technicians (AMT) maintain aircraft in the United States (United States Bureau of Labor Statistics, 2021). The Federal Aviation Administration (FAA) predicts that the United States' domestic passenger demand will grow by two percent per year until 2040 (Aviation Forecasts, 2021). As the demand for air travel increases, the commercial sector will need to secure additional qualified AMTs. The United States Bureau of Labor Statistics predicts that the AMT need will increase by five percent per year over the next decade, faster than the national average of all other occupations (United States Bureau of Labor Statistics, 2021). With the growing need for qualified AMTs in the foreseeable future, universities, colleges, and technical schools, the traditional starting point for AMTs, will need to meet this demand. When examining current statistics of gender representation among airline AMTs that make up the United States airline AMT population, one statistic is evident: a shortage of licensed female FAA AMTs. The need for more qualified licensed AMTs creates an opportunity for more females to get trained to fill that need. According to Aircraft Maintenance Technician Schools (2022), the traditional starting point to become a licensed AMT in the United States, an individual must attend a Federal Aviation Administration Part 147 program. Part 147 programs focus on the

training, skills, and ability to perform maintenance on aircraft like commercial airliners flown by United States airline carriers.

According to the FAA website data, the aviation industry comprises 19.5 percent of women (Aviation Forecasts,2021). Of this total, approximately three percent are licensed female AMTs in the US, highlighting the uneven gender profile (Bjerregaard, 2021a).

Statement of the Problem

According to the latest figures obtained through the United States Census in 2020, the United States' total population was 49.5 percent male and 50.5 percent female (Census Quick Facts, 2022). Despite more females living in the United States, there is a disparity in female AMT representation in the United States airline industry. Approximately three percent of the total AMTs are female (Bjerregaard, 2021a.). The United States Bureau of Labor Statistics (2021) reported 160,000 AMT jobs in 2019, with a positive outlook for a growth trajectory rising five percent between 2019 and 2029. The positive outlook is faster than average increases in all occupations, and in the future, the need for additional qualified AMTs is because of individuals leaving the profession. Additionally, the United States Bureau of Labor projects a positive outlook regarding the future demand for additional qualified airline AMTs, allowing more opportunities for better female representation (United States Bureau of Labor Statistics, 2021).

According to Bjerregaard (2021b), airlines need to break the model of what a typical AMT would be perceived to be: white and male. Bjerregaard (2021b) discusses the importance of females being injected into the equation to provide a more robust workforce that capitalizes on the strengths both men and women equally bring to aviation. This research investigates the current representation of females enrolled in FAA-certified programs and

seeks to identify the number of women enrolled in AMT programs at United States universities, colleges, and technical schools. The researcher hopes that investigating the current representation of female AMTs can help identify opportunities to reduce the underrepresentation of female AMTs in United States airlines.

Purpose of the Study

This study seeks to identify the representation of aspiring female AMTs at United States universities, colleges, or technical school aircraft maintenance technology programs. The study also seeks to identify if universities, colleges, and technical schools know about the underrepresentation of female AMTs in the industry and how they plan to address the issue. This study's long-term goal is to help identify and resolve problems associated with the gender disparity among AMTs and to better represent women as licensed airline mechanics in the United States.

Research Questions

The following research questions guided this study:

1. Does agreement exist between the United States Bureau of Labor Statistics and AMT students at universities, colleges, and technical schools concerning the underrepresentation of females?
2. Are current aviation maintenance technology program directors/faculty at United States universities, colleges, and technical schools aware of the present disparity/representation between male/female aviation maintenance technicians at United States airlines?

3. Are the current aviation maintenance technician program directors/faculty at United States universities, colleges, and technical schools identifying solutions to close the disparity/representation gap between/male/female aviation maintenance technicians in United States airlines?

Significance of Study

With the impending shortage of qualified AMTs in the United States due to retirements and the growing demand for air travel and airline employees, it is essential to influence more men and women to become airline mechanics. This study examines the number of females currently enrolled in FAA-approved programs seeking to be licensed AMTs. Identifying enrollment at the beginning level can help the industry understand the future trajectory of licensed female AMTs. This inquiry also sought to investigate initiatives universities, colleges, and tech schools are implementing to market an airline mechanic career as a viable choice, no matter gender. This study hopes to aid in closing the present disparity and representation between males/females in the United States airline mechanic population.

Limitations

With regard to the impetus of this inquiry, constraints and presumptions are proposed:

- This inquiry depends on a non-compulsory involvement of universities, colleges, and technical schools accredited by the University Aviation Association (UAA) with FAA-approved professional aviation maintenance

technology programs. Not all university, college, and technical school aviation departments will likely choose to participate.

- When collecting data, this inquiry is limited to universities, colleges, and technical schools listed in the latest UAA Collegiate Aviation Directory version. The current directory posted on the UAA website is dated 2021.
- There is a presumption that all university, college, and technical school AMT programs that participate will do so truthfully to the best of their ability.

Definitions of the Terms

This section defines terms that are used throughout this research study:

Aviation Maintenance Technician (AMT) - an aviation maintenance technician (or AMT) is a skilled tradesperson who oversees and performs essential aircraft maintenance. These duties include: performing regular airplane checks, airplane repairs, fault finding, using computers, technology, diagnostic systems, and troubleshooting.

Aviation Maintenance Technology Program - A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain all aircraft components/systems.

Commercial Sector – with regards to the airline industry, involves operating aircraft for hire to transport passengers Federal Aviation Administration (FAA) - governmental division within the Department of Transportation responsible for the regulation and implementation of safety for the civil and commercial aviation industry.

FAA Licensed Female Airline AMT – a female who works as an aviation maintenance technician and has obtained an Airframe/Powerplant license, a rating the Federal Aviation Administration gives.

Gender - is used to describe the characteristics of women and men that are socially constructed.

Under-representation - insufficient or inadequate representation.

United States Airline - a company within the United States that provides air transport services for traveling passengers.

United States Bureau of Labor Statistics - measures labor market activity, working conditions, price changes, and productivity in the United States economy.

United States Census – is a national survey conducted every ten years to enumerate the population for taxation and political representation. The United States Constitution legally mandates it.

University Aviation Association (UAA)- is a professional academic national organization identified as the voice of collegiate aviation to its members, the industry, government, and the general public.

CHAPTER II

REVIEW OF RELATED LITERATURE

The review of related literature examines an overview of an aviation maintenance technician, the current state of the United States airline industry with an emphasis on the need for more qualified AMTs, the underrepresentation of female AMTs in United States airlines, and the overall underrepresentation of females within the airline industry.

Overview of an Aviation Maintenance Technician

An Aviation Maintenance Technician (AMT) is a skilled professional whose primary job is maintaining an aircraft to airworthiness standards. In the United States, airworthiness standards are established by the Federal Aviation Administration. A typical skillset for becoming an AMT would include: the fabrication of parts, maintaining aircraft systems, troubleshooting, ability to read technical information manuals, ability to communicate, working in a team environment, as well as working alone (Become an Aviation Mechanic, 2022).

Two pathways to becoming an FAA-qualified AMT are through university, college, or technical school AMT programs or on-the-job training programs to gain experience before taking FAA-required general, airframe, and powerplant tests (Become an Aviation Mechanic, 2022). AMT programs at universities, colleges, and technical schools are generally two and four-year programs. A two-year AMT program equips a

student with a skillset to become an FAA-licensed Airframe/Powerplant mechanic (total training hours to receive both licenses is 1900 hours), the four-year program would be for a student pursuing a position in an aviation maintenance management career (Aviation Maintenance Technology Degree and Training Programs, 2021).

Current State of United States Airline Industry

According to Silk (2022), an AMT shortage could lead to a decline in airline operations, which has opened a need to increase additional AMTs. Waguespack et al. (1998) researched the effect of a shortage of qualified AMTs on the airline industry by examining global aviation activity, poised for a decade of sustained growth. This research analyzed three key areas: (1) the future outlook of the aviation industry within the United States, (2) the future outlook of the aviation industry worldwide, and (3) the current trends in training for AMTs both in the United States and worldwide. The data analysis pointed out a breakdown that could profoundly affect airline operations. Critical analysis within Waguespack's study suggested that the United States economy correlated with the airline industry's direction. The investigation examined the future of the aviation industry, concluding that because of the demographics with an increase of retired Americans with more disposable income, there would be an increase in airline travel. In addition to the projected increase in airline travel, combined with a stagnant growth of the AMT population, the culmination of the study pointed to a hardship on airlines because of the AMT shortfall.

Harl (2014) examined how leadership development issues have loomed over the aviation industry every 10 to 14 years, leading to a cycle resulting in a shortage of AMTs, which brought a heightened awareness of the looming retirements of previous

generations resulting in this shortage. The United States Bureau of Labor Statistics (2021) projects that an average of 14,400 AMT openings will exist, with retirements of older AMTs as the primary reason over the next decade. Previously when there was a shortage of AMTs at the airlines (for example, in the 1960s), white males were the answer to that need. Today the airlines need to look beyond what was then the solution. The United States demographics continue to change with the growing demand for aviation employees affecting the economy, politics, and technology. Harl (2014) points to a fresh idea that could help fill the leadership vacuum within the airline industry called Aviation Workforce Development (AWD). AWD is a group designed to take long-term progressive approaches to change from the previous ways of implementing aviation leaders to being more representative of today's labor force. The central solution for AWD is to continue building a data bank that will ensure a significant shift in processes like marketing, training, and recruiting new aviation leaders with forward-thinking ideas. With this shift in cycles, the goal is to retain influential aviation leaders who will help solve problems that plague the aviation industry, such as the shortage of licensed AMTs and the gender representation gap.

Moore (2001) conducted two surveys investigating the aircraft maintenance technician shortage. The survey results were analyzed to determine AMT schools and airlines' connection in resolving issues surrounding the scarcity of qualified AMTs. Moore's findings demonstrated a positive relationship between schools and airlines that working together could positively impact addressing the AMT shortage.

Bruce (2020) sought to address the challenges of attracting new talent to aviation and explore innovative ways to help overcome those challenges. Bruce discussed ways to

expand aviation career outreach efforts beyond K-12 to introduce new talent. Bruce found that immersive technology (examples: augmented reality, virtual reality, and mixed reality) by aviation instructors in the classroom stimulated interest in students to pursue aviation as a career choice, possibly as AMTs. A study by Johnson (2018) had similar findings. Johnson noted that a cooperative effort between AMT schools, the airline industry, and the United States FAA could help give the AMT occupation a perception of being a professional career choice. In addition, implementing up-to-date training programs and technology (with commercial jets instead of general aviation aircraft) could help elevate being an AMT to a more desirable career choice, ultimately aiding in the AMT shortage.

Examinations by Williams & Rhoades (2006) and Kinane (2010) emphasize the importance of aviation maintenance collegiate programs aiding in reducing the shortage of qualified AMTs. Williams & Rhoades (2006) studied AMT school programs and how these schools are addressing solutions that inspire students toward an aviation career. Their study indicated that the aviation industry's future growth depended on the increased demand for air travel and advancements in aircraft technologies. Through advanced technologies (like Computer Based Training) within AMT institutions, they concluded skills like reading comprehension would improve, along with better opportunities for AMT students to seek graduate degrees. With these more significant opportunities, recruiting more women could also produce more career-minded female AMTs to fill the present shortage of qualified aviation maintenance technicians within the airline industry. Kinane (2010) found that the profession's negative perception contributes to the declining number of students entering aviation maintenance. According to the study,

disappointment occurs when expectations do not match reality. The reality is that being an aviation maintenance technician can be a demanding profession requiring skill and the ability to work anytime, day or night, under a variety of weather/working conditions that are determined by operational needs. Kinane (2010) also confirmed that some individuals entered aviation maintenance studies with presumptions about the profession but dispelled the belief that once a graduating AMT student enters the aviation industry, they suffer from job dissatisfaction.

Underrepresentation of Female AMTs in Aviation

Beneficial research on the effects of the underrepresentation of women AMTs within the aviation industry was accomplished in studies by Newcomer et al. (2016), Stevenson et al. (2020), and Stevenson et al. (2021). These representative inquiries had a commonality of revealing the barriers that have hindered women from choosing an AMT career for their occupation.

Newcomer et al. identified that certified AMTs have the highest gender difference in aviation, with a male-to-female ratio of 49 to 1. Their research revealed that social approval within the working environment was essential in predicting if women could succeed in the aviation workplace. The findings showed a substantial gap in men's and women's workplace safety and social acceptance views. The inquiry found that most women in the study were uncertain or pessimistic about their advancement prospects and social acceptance in the aviation industry. Stevenson et al. (2020) examined the increase in females and males in six aviation occupations in the private sector from 2005 to 2018. The research showed that women's ability to seek another job position over time was

more unpredictable than males and that females continued to make up a relatively small percentage of the overall workforce in aviation occupations.

Stevenson et al. (2021) investigated how women expressed more concern about workplace sexual harassment and gender inequality than men. In the study, women who participated indicated feeling somewhat less secure than men in complaining to management. According to the results, a significant barrier for women in aviation occupations is operating in an atmosphere dominated by men. The findings indicated that women and men have similar views of various facets of their workplace, most notably job satisfaction, professional development opportunities, and demanding jobs.

Federal Aviation Administration (2009) reported and identified successful strategies for meeting emerging AMT labor market needs through nontraditional worker recruitment, training, selection, and retention in which historically white males dominated AMT career areas. Federal Aviation Administration (2009) identified several techniques that may be beneficial in encouraging nontraditional candidates, such as women, to pursue AMT jobs. This report forecasted future AMT employee supply and demand for labor shortages and developed effective strategies for addressing the lack of diversity in aviation maintenance careers. One specific example of a successful design from the Federal Aviation Administration 2009 study outlined by Belt & Bollock (2020) studied the increasing shortage of aircraft mechanics that pressures the aviation industry to recruit young people. The recruitment trends attempt to expand access to underrepresented groups, including women.

Looking for solutions to the underrepresentation of females within the aviation industry was studied by Thompson (2003) and Kearns (2020). Thompson aimed to

ascertain the factors influencing prospective students' decision to pursue a postsecondary degree in aviation maintenance. The researcher surveyed all students majoring in aviation maintenance management at a large public university in the Midwest. Kearns (2020) revealed three primary themes for the next generation of aviation professionals: attract, inform, and retain. Training activities must improve efficiency and relevance to the work. This type of training can include incorporating competency-based and evidence-based training, new immersive training tools, e-learning, and simulations. Among the topics discussed are the characteristics of younger generations, gender equality, sustainability, outreach ideas, youth participation methods, marketing and communications, outreach in developing versus established markets, and aviation education in primary and secondary school.

Overall Underrepresentation of Females in Aviation

Sanders & Lubetkin (1989) and Soares & Acosta (2019) researched the value of education and its effects on balancing gender disparity within the workplace. Sanders & Lubetkin (1989) studied how most work on gender equality in mathematics is predicated on the implicit presumption that only legitimate professions require a bachelor's degree, preferably a doctorate. This assumption obscures that technician jobs pay well for the amount of education needed. Technician jobs are worthy career goals for many women who would otherwise be relegated to dead-end, low-paying gender stereotypes. Future efforts for gender equality must transcend the elitist assumptions inherent in this implicit presumption. Soares & Acosta (2019) researched specifically how aviation/aerospace is not a gender-balanced market, resulting from current gender stereotypes in education. Numerous factors affect women's involvement in aviation/aerospace. It is necessary to

incorporate measures that will result in significant and lasting improvements in women's interest in the aviation/aerospace sector.

In workplace studies that were virtually two decades apart, many of the same problems addressing gender balance existed. Turney (2000) investigated how the percentage of women drawn to careers in aviation remained relatively poor. This article reviewed the literature to determine why the number of women choosing careers in aviation remained stagnant over two decades. Harvey et al. (2019) studied how women play a critical role in civil aviation but have a poor systemic position. As a result, expectations are that women will experience a high degree of job insecurity. The inquiry documented common perceptions of income insecurity, job insecurity, and work insecurity.

A study conducted by Casebolt & Khojasteh (2020) assessed how the aviation industry in the United States continues to lag in addressing the issue of women being underrepresented. A central conclusion from this study was that collegiate students recognized that the underrepresentation of females existed within higher education and the aviation industry. Natural solutions can be realized by identifying the aviation industry's current problem regarding the underrepresentation of women. The Casebolt & Khojasteh inquiry complimented and solidified a Women in Aviation International study. Women in Aviation International (WAI), a nonprofit organization dedicated to encouraging and advancing women in all aviation career fields and interests, reports that women make up under thirty percent of the industry of non-pilot aviation careers and seven percent of pilots. This research aimed to identify obstacles female collegiate students face to reduce the aviation industry's representation gap. The WAI study from

2020 complemented the previous research from Clark et al.(2018) that examined how women account for just 2.3 percent of the certified aircraft mechanic workforce in the United States, which would place female AMTs as a minority within the framework of all females working in the aviation industry.

Recently, examining possible solutions has led to a better AMT gender balance. Foster (2018) discovered that aviation maintenance training programs must look to the underrepresented minority community, like women, to recruit new students. By encouraging minorities of all backgrounds to pursue aviation professions, the industry will benefit from a wider pool of prospective students. Douglas & Mrusek (2020) studied how to measure leaders' decision-making methods in aircraft maintenance and the perceptions of technicians. Findings informed leaders' decision-making and contributed to the women entering and remaining in the aircraft maintenance pipeline. The study helped address workforce shortages and retention strategies for women in male-dominated careers such as aviation.

CHAPTER III

METHODOLOGY

Research Population

The research population for this study was AMT program directors and faculty at United States universities, colleges, and technical schools offering two-year or four-year AMT programs with accreditation by University Aviation Association.

Description of Research Instrument

This research was a mixed-method study concerning the underrepresentation of female AMTs in the United States airline industry. The study also sought to determine if the Bureau of Labor Statistics data on the underrepresentation of female AMTs reflected the current underrepresentation in AMT schools. The research instrument included demographics, Likert scale statements, and a personal comment section. Questions in the first section of this research instrument determined the demographics of the participating university, college, or technical school AMT department. The second section comprised eight Likert-scale statements that gave insight into the university, college, or technical school aviation maintenance technology programs concerning female representation. The statements were a series of five-point Likert scale statements, including strongly disagree, disagree, neutral, agree, and strongly agree. The third section provided an occasion for additional qualitative feedback through personal comments from the participating

institution. Numeric pseudonyms were used to protect the anonymity of the participating institutions within this study.

Reliability and Validity

The second section of the research instrument was analyzed using Cronbach's Alpha. Cronbach's Alpha measures the Likert scale's multiple-choice internal consistency (Taber, 2018). Cronbach's Alpha was used in the methodology to determine overall reliability. The statements were converted to data assigned as follows: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). Acceptable reliability for Cronbach's Alpha is a score above 0.5. Satisfactory reliability is a score of 0.7 (Taber, 2018).

The research instrument's content validity was ensured by examining and critiquing aviation professionals within higher education in aviation academia. The critics confirmed the research instrument was clear to understand and adequately constructed to collect data related to the research topic.

Data Collection Procedures

The collection of data for this research involved a four-step process. Initially, the researcher identified two-year and four-year United States universities, colleges, or technical schools accredited by the University Aviation Association (UAA) with Aviation Maintenance Technician programs. After identifying AMT programs, the researcher emailed an anonymous link of the online research instrument (Appendix A) to aviation directors/faculty utilizing Qualtrics statistical software to the recognized programs that met the research criteria. The online research instrument included a Participant Research

Informed Consent Form (Appendix D) approved by Oklahoma State University Institutional Review Board (IRB-22-23) which the participant completed before opening the research instrument to ensure ethical research practices. After emailing the online research instrument via Qualtrics, the researcher waited two weeks before sending a reminder notice via Qualtrics to those institutions, thanking them for their participation and a reminder notice. After the data collection period of two months, the researcher used Qualtrics Statistical and Qualitative Data Analysis software and Microsoft Excel to code and analyze the findings. As a 37-year career Aviation Maintenance Technician, this researcher utilized reflexivity to examine my judgments, practices, and belief systems during the data collection process (Reflexivity, 2022). By using a reflexive journal, I was aware that when conducting my research study, *Reimaging the United States Airline Industry by Increasing Female Aviation Maintenance Technicians,* the need to remain neutral in my views while listening to the findings from the perspective of an unbiased researcher. The findings will be presented in Chapter IV. The researcher completed the data collection and started analyzing the data on April 11 1, 2022.

Analysis

Descriptive statistics were used in this study to reveal perceptions of the director/faculty concerning participant AMT programs. This study utilized descriptive statistics to organize, analyze, and summarize data collected by the research instrument. According to Lee (2020), descriptive statistics summarize data values. Descriptive statistics provide information that can be used to compare differences in a data series. Descriptive statistics were used in this inquiry to help describe patterns from the

director/faculty responses that came out from the data. Descriptive statistics also encapsulated the data by using percentages. Besides the descriptive statistics, Likert statements were analyzed using Cronbach Alpha to measure the internal reliability. Taber (2018) uses the following value range descriptors from leading scientific journals to determine Cronbach alpha acceptability; $\geq$ .5-Acceptable; $\geq$ .6-Satisfactory; $\geq$ .7-High; $\geq$.8-Reliable; $\geq$.9-Strong. Data for this research was entered into Qualtrics Statistical and Qualitative Data Analysis software and Microsoft Excel spreadsheet. The result was an alpha coefficient value of .679, which was satisfactory according to the Taber scale.

The Likert statements in section 2 of the research instrument were analyzed using Pearson's Correlation Coefficient to determine the statistical relationship between variables (*Pearson's correlation coefficient*, 2021). The AMT program participants were the independent variable, and the perceptions of the AMT program were the dependent variable for this study. The following value range according to Pearson's correlation coefficient (2,021) determines the degree of correlation: + 1 (Perfect); + 0.50 and + 1 (High degree); + 0.30 and + 0.49 (Moderate degree); below + 0.29 (Low degree); 0 (No correlation).

CHAPTER IV

FINDINGS

Chapter IV presents the research findings based on three sections of the research instrument. The research instrument for this inquiry was designed to collect data for the findings, which reflected the essence of the three research questions from Chapter I, page 3. The first section of the research instrument consisted of the demographics of the participating university, colleges, or technical schools. The demographic questions asked participating institutions about the following: location within the United States, length (in years) of aviation maintenance technology (AMT) program, the current size of students majoring in the program, percentage of current students that are female, percentage of current female students that were women of color or minorities, percentage of female students that completed the program, and percentage of AMT faculty that were female. The second section of the instrument consisted of Likert-scale statements on perceptions by the participating director/faculty member of the participant's AMT program. The last section was additional information that allowed participants to express specific initiatives their institution used to recruit female AMT students.

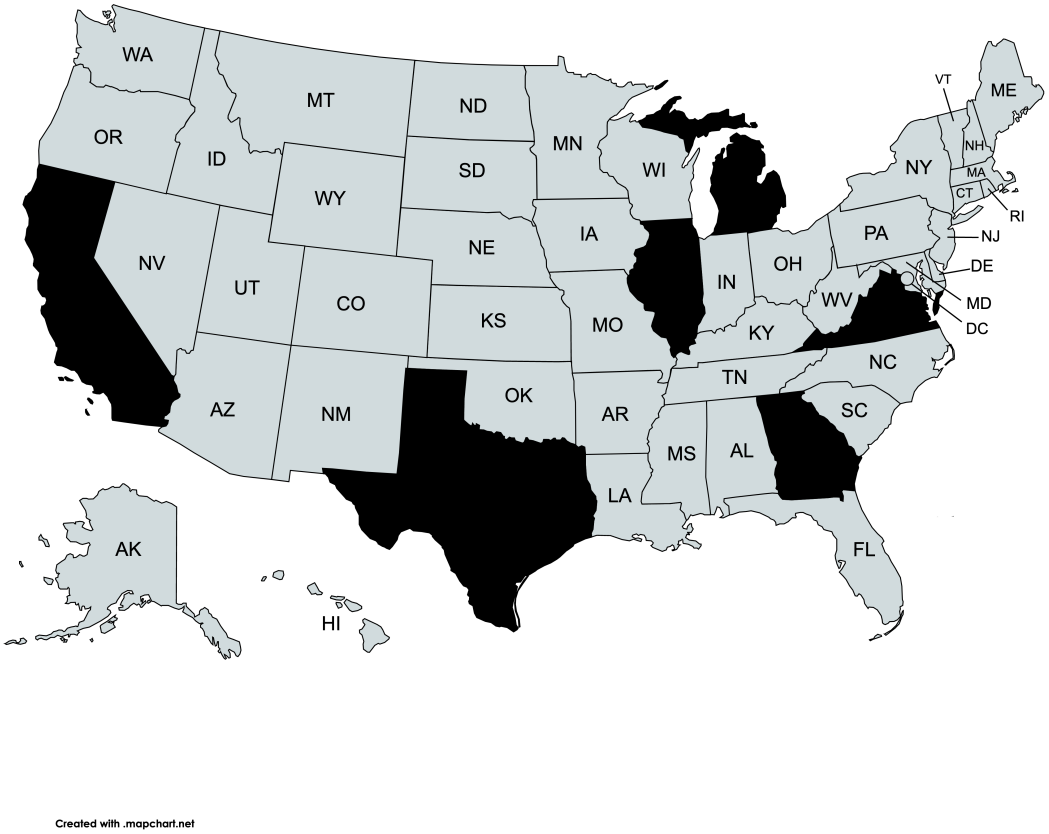
Participating Institutions and Response Rate

The research instrument was distributed to directors/faculty anonymously through Qualtrics to 49 different universities, colleges, and technical schools that met the criteria

outlined by the research. The open period for the research instrument was from January 31-March 31, 2022. Four emails were not deliverable to the 49 institutions identified as possible participants in the study. A total of 10 institutions participated, contributing data for this inquiry for an overall response rate of 22 percent. The ten participating institutions were geographically located in 6 different states. (Figure 1).

FIGURE 1.

Geographic Location of Participating Institutions



Note: shaded areas represent states of institutions that participated in the study

Characteristics of University, College, or Technical School

Question 1 had the participants identify the state where their university, college, or technical school AMT program was located. The study participants were found in the

following states: California (4 institutions), Georgia, Illinois, Texas (2 institutions), and Virginia (2 institutions).

Question 2 asked if the participants' AMT program was a two-year, four-year, or other program. Of the ten responses, 8 (80%) indicated they were a two-year program, 1 (10%) indicated they were a four-year program, and 1 (10%) was other, as shown in Table 1.

Table 1
Length of AMT Program

Length of AMT Program	Responses	Percentage of Responses
Two year	8 of 10	80%
Four year	1 of 10	10%
Other	1 of 10	10%

Participants were asked in question 3 the number of current students majoring in their AMT program. Of the ten responding institutions, the total number of currently enrolled students for all the programs was 1507. A breakdown of the student population is in Table 2.

Table 2
Participating Institution Student Breakdown

University, College, or Technical School Pseudonym	Response by the participant to the total number of students	Percentage of the student total of participants in the study.
1	32 of 1507	2%
2	30 of 1507	2%
3	700 of 1507	46%
4	3 of 1507	<1%
5	547 of 1507	36%
6	87 of 1507	6%
7	27 of 1507	2%
8	34 of 1507	2%
9	25 of 1507	1%
10	51 of 1507	3%

The percentage of current AMT students who were female within the participant's institution was inquired about in question 4. Table 3 indicates the percentage of AMT female students in the respondents' AMT program, with 80% (8 of 10) institutions showing a 5 percent or more significant portion of female AMT students. Table 3 below uses Pseudonyms 1-10 to protect the anonymity of the participating institutions.

Table 3
Percentage of AMT students who were female

University, College, or Technical School Pseudonym	Percentage of Female Students
1	5%
2	0%
3	9%
4	6%
5	4%
6	73%
7	7.4%
8	6%
9	12%
10	6%

Question 5 asked institutions the percentage of female AMT students that were women of color. Forty percent (4 out of 10) of participants indicated a ratio greater than 60%, whereas 30% (3 of 10) acknowledged a percentage of 0.

Question 6, asked about the percentage of female AMT students that completed the participating institution's program. Most participants (7 of 10) expressed that 50% or more female students completed their program.

AMT faculty participants were queried about the percentage of female instructors within their programs in question 7. The results to question 7 revealed that 60 percent (6 of 10) institutions had 0 female instructors, with the remaining 4 participants having an average of 12 percent female AMT program instructors.

Perceptions of Your University, College, or Technical School AMT Program

The second section of the research instrument explored the perceptions of the director/faculty concerning their AMT program. The eight Likert-scale statements asked the director/faculty to give their perception using the five possible responses: strongly, disagree, disagree, neutral, agree, and strongly agree.

Table 4

Likert Statements 8-11

Likert Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
"In your opinion, there is a growing need for qualified AMT technicians in the United States."	0	0	0	0	100%
"In your opinion, there is an underrepresentation of female AMT students at your institution."	0	0	0	50%	50%
"In your opinion, AMT programs equitably recruit male and female students."	0	30%	30%	20%	20%
"In your opinion, AMT programs provide male and female students the same opportunities."	0	0	0	20%	80%

Statement 8 inquired about the participants' opinion of a growing need for qualified AMT technicians in the United States. One hundred percent of the participants strongly agreed there is an increasing need for more qualified AMT technicians in the United States. Statement 9 asked those participating in this study their opinion on the underrepresentation of female AMT students in their program. All respondents thought there was evidence of underrepresentation and agreed or strongly agreed with the statement. Statement 10 examined if AMT programs of those participating in this study felt there was equitable recruitment of male and female students. Results indicated a mix of responses, with the majority (40%) feeling there was unbiased recruitment. Statement 11 asked AMT programs if male and female students had the same opportunities to succeed. Eighty percent (8 of 10) strongly agreed that their programs gave equitable opportunities. Table 4 (above), *Likert Statements 8-11,* illustrates these results.

Statement 12 investigated if AMT programs surveyed provided adequate scholarships to attract and support female students. Half of the respondents (50%) agreed or strongly agreed that the same scholarships were provided to female students; the other (50%) disagreed or strongly disagreed, as noted in Table 5. Table 5 also presents data regarding creating appropriate cultural conditions to retain and graduate female students for statement 13. The results were 40% disagreeing (4 of 10) and agreeing at 40% (4 of 10). Statement 15 inquired about the perception of the participant's institution addressing the issue of support for diversity and inclusiveness initiatives. An overwhelming 80% of respondents strongly agreed their university, college, or technical school AMT program supported diversity/inclusiveness initiatives Table 3. Statement 16 inquired about

participants' opinions that AMT programs are actively identifying solutions to close the disparity between male and female aviation maintenance technicians at United States airlines. Fifty percent (5 of 10) gave a neutral response, with 30% (3 of 10) feeling there were not enough solutions actively identified in AMT programs to close the disparity in Table 5 on page 27.

Table 5
Likert Statements 12, 13, 15, 16

Likert Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
"In your opinion, AMT programs provide adequate scholarships to attract female students."	10%	20%	20%	40%	10%
"In your opinion, AMT programs create appropriate cultural conditions to help retain and graduate female students."	0	40%	20%	40%	0
"In your opinion, AMT programs adequately support diversity and inclusiveness initiatives."	0	10%	10%	0	80%
"In your opinion, AMT programs are actively identifying solutions to close the disparity between male and female aviation maintenance technicians at United States airlines."	10%	20%	50%	20%	0

Statement 14 was a follow-up to statement 12 to reveal the total number of scholarships (in dollars) provided to female AMT students over the last three years, as illustrated in Table 6.

Table 6
Total Amount of Scholarships Provided to Female AMT in the Last Three Years

University, College, or Technical School Pseudonym	Dollar Amount Response
1	Did not answer
2	Unknown
3	$50,000
4	New program did not know those figures.
5	$15,000
6	0
7	Unknown
8	$10,000
9	$5,000
10	$54,000

Personal Comments

Section three of the research questionnaire allowed participants to give qualitative data concerning their institution's specific initiatives to recruit female AMT students. Five respondents submitted statements to the question, "What initiatives is your institution taking to recruit female AMT students?" Institution 1 replied, "Recruiting more through organizations such as Women in Aviation." Institution 4 used the local news media to market its aviation programs to females. The institution also uses recruiters that target high school students. Institution 4's participant wrote, "We have had several local news interviews where we specify that our program is open to females and males who love aviation and are interested in maintenance. We have recruiters who attend high schools and recruit for the AMT and our flight program. We have several

female applicants for both programs". Institution 7 also had a similar initiative as Institution 4. Institution 7's response, "Inviting high school students male and female, all of our recruiting efforts are targeting both male and female, however, not specific to gender." Institution 8 uses a World War II icon to promote its initiative in recruiting females for its AMT program. Institution 8 replied, "We hold a "Rosie the Riveter" day twice a year (pre-COVID) where we invite-only females to participate in aviation maintenance-related activities taught by only female instructors." Lastly, Institution J does have recruitment initiatives, but they are not targeted exclusively at females. Institution 10's response, "Our recruitment initiatives do not target individuals based on race, gender, or other demographics. We are a community college that actively recruits primarily from local high schools. Other recruitment efforts are more passive as the local aviation industry is well known and interest comes through word of mouth and media exposure".

Analysis

Using the compiled data collected for all participants from the Likert-scale statements, internal reliability was calculated using Qualtrics Statistical and Qualitative Data Analysis software and Microsoft Excel. Internal consistency (reliability) was examined using Cronbach's Alpha using Microsoft Excel to perform ANOVA (Analysis of the Variance): Two-Factor Without Replication for the Likert statements. The result was an alpha coefficient of .679. According to Taber (2018), the acceptable reliability for Cronbach's Alpha is a score above 0.6. In addition to the 8 Likert statements in section 2, one statement asked about scholarship dollar amounts over the previous three years.

A Pearson's Correlation Coefficient was utilized to examine the perceptions of 10 AMT programs to determine a statistical relationship between variable x (Participating AMT programs) and variable y (The perceptions of AMT program participants). The data found the Pearson Correlation Coefficient between the two variables to be .53 with a corresponding p-value of .003. According to Pearson's correlation coefficient (2021), there was a high degree of correlation between the AMT program participants and the perceptions of their respective programs.

The interpretation of results from the research questionnaire and personal comments will be discussed in Chapter V.

CHAPTER V

CONCLUSION

This study determined that underrepresentation exists for female aviation maintenance technicians (AMT) in the United States airline industry, despite the need for more qualified AMTs. The opinions of the aviation directors/faculty who participated in this study identified solutions that may help more female AMTs fill that void in the United States airline industry. These gains are not to fill a quota based on gender but to demonstrate to women they can have a successful career as an AMT for a United States airline.

Summary of the Research

This national research study examined the perceptions of female AMT under-representation by aviation directors/faculty from two-year and four-year AMT programs at universities, colleges, and technical schools that the University Aviation Association accredited. The focus of this study was to determine if underrepresentation exists for female AMTs by analyzing and comparing the data from the United States Bureau of Labor statistics and higher education institutions for AMT programs.

Research Question 1: Do the current United States Bureau of Labor statistics concur with female AMT students' underrepresentation at universities, colleges, and technical schools?

AMT directors/faculty of this research agreed 100 percent that there is an underrepresentation of female AMT students at their institutions. The underrepresentation mirrors the characteristics data regarding female student enrollment collected from section 1 of the research questionnaire for this study. Additionally, 40 percent of the participating institutions had more than 50 percent of their female students as women of color. This data illustrates that women of color who are AMT students envision an opportunity to have a career as an AMT, which will aid in reducing the current underrepresentation of female AMTs.

Positive changes in the researcher's findings for this study could be due to the cultural differences in AMT programs in the last thirty years. One positive solution to recruit female AMT students mentioned by a respondent in Section 3 of the research questionnaire was inspired by a World War II icon for female aircraft builders, "Rosie the Riveter." The aviation faculty member wrote, "We hold a "Rosie the Riveter" day twice a year (pre-Covid) where we invite-only females to participate in aviation maintenance-related activities taught by only female instructors." As illustrated by this response, these events could help gender stereotypes and present opportunities for women to become future AMT students.

The input revealed by the 10 AMT program participants agreed with the statistics published by the US Labor Bureau. All 10 participants strongly agree that there is a

growing need for additional qualified AMTs and an uneven gender disparity concerning female AMT students within their programs.

Research Question 2: Are current aviation maintenance technology program directors/faculty at United States universities, colleges, and technical schools aware of the present disparity/representation between male/female aviation maintenance technicians at United States airlines?

According to the results of this study, aviation directors/faculty are very aware of the disparity in the aviation maintenance sector in the US airline industry. However, they still seem to agree that AMT programs equitably recruit male/female students. Despite the unbiased recruitment of AMT students, there was more disagreement that AMT programs were actively identifying solutions to close the gender gap. The personal comment section asked about specific initiatives that institutions were doing to recruit females; due to the lack of replies, the researcher concludes that there is an improvement needed for female representation. A compelling contrast discovered by the findings was that despite the participating institutions' lack of actively identifying solutions to close the disparity between male/female AMTs, there was an 80 percent agreement (8 of 10) that AMT programs adequately support diversity and inclusiveness initiatives.

Research Question 3: Are the current aviation maintenance technician program directors/faculty at United States universities, colleges, and technical schools identifying solutions to close the disparity/representation gap between/male/female aviation maintenance technicians at United States airlines?

Five AMT programs participating in this study identified solutions in section 3 of the research data. The section asked, "What specific initiatives is your institution taking

to recruit female AMT students?" to help close the disparity/representation gap. One response noted alignment with Women in Aviation International (WAI) to inspire more females to become part of the aviation industry like AMTs. Other AMT program directors/faculty used various ways of connecting to local high school students, as mentioned in these remarks, "We have had several local news interviews where we specify that our program is open to females as well as males who have a love for aviation and an interest in maintenance. We have recruiters who go to high schools and recruit for programs, AMT, and our flight programs. We have had several female applicants for both programs" also replies, "Inviting high school students male and female, all of our recruiting efforts are targeting both male and female, however, not gender-specific." Universities, colleges, and technical schools' efforts to connect with high school students (predominantly female students) would agree with the Kinane (2010) study that showed a significant relationship between social status and job satisfaction.

An encouraging initiative to attract more female AMT students is providing scholarship opportunities. In this study, seventy percent of the participants gave a response of neutral to strongly agreed with the statement, "In your opinion, AMT programs provide adequate scholarships to attract female students," the scholarships over the last three years of the 50% of directors/faculty that answered, averaged $26,800. The researcher agrees that by helping with the financial burden of college tuition, scholarships can help relieve and can help create appropriate cultural conditions to help retain and graduate female students.

Conclusion

This national study, *Reimaging the United States Airline Industry by Increasing Female Aviation Maintenance Technicians,* investigated the underrepresentation of qualified female aviation maintenance technicians (AMTs) at United States airlines that need to fill their AMT supply pipeline, which is higher than the national average of other occupations. The results from this study determined that underrepresentation exists for female aviation maintenance technicians (AMT) in the United States airline industry despite the overall need for more qualified AMTs. This research study sought answers to help close the disparity and representation between male/female AMTs at airlines within the United States. With a shortage of qualified AMTs in the United States due to aging AMTs, retirements, and Covid-19, plus the growing air travel demand, it is essential to inspire future AMTs without regard to gender to fill this void.

In Chapter I, data from the Federal Aviation Administration (FAA) showed that in 2021, 3 percent of the United States FAA-licensed AMTs were female. The data from this research study found the average percentage of female AMT students within the participating institutions at thirteen percent, of which 56 percent completed their AMT program. The researcher concludes that these numbers are encouraging for the future, not only for reversing the underrepresentation but also helping supply the airline industry with more AMTs. To ensure future gender parity among airline AMTs, there is a need for a higher completion rate at universities, colleges, and technical schools with AMT programs.

One unexpected finding of this study was that of the 13 percent of the total population of female AMT students, 34 percent were women of color. Examining the

data from one institution (Institution 10), a two-year AMT program stood out the most. Institution 10 had 6 percent of female AMT students, with 100 percent being women of color, and awarded $54,000 in AMT scholarship money the previous three years. In section three of the research instrument, Institution 10 replied, "Our recruitment initiatives do not target individuals based on race, ethnicity, or other demographic. We are a community college that actively recruits primarily from local high schools." Withrow, S. (2022), In-*Building Tomorrow's Aviation Mechanic Workforce with Women,* outlined the importance of scholarships to reduce the financial burden that can profoundly affect those underrepresented within the AMT occupation. According to the article, the Association of Women in Aviation Maintenance (AWAM) stresses that scholarships improve accessibility for more women to become AMTs.

The researcher discovered in analyzing the data a more significant percentage of female AMT students (13 percent) despite a lower rate (5 percent) of female AMT instructors. The researcher does not believe that having fewer female AMT instructors is beneficial in helping close the gender gap between male/female AMT students. Organizational changes towards inclusion within AMT programs at universities, colleges, and technical schools through education with organizations like WAI/AWAM may be more critical in recruiting/retaining female AMT students. The changing of perspectives could be attributed to institutions providing an equitable opportunity for male/female AMT students to be successful, along with diversity/inclusive programs that promote a sense of belonging by breaking down prejudices and stereotyping. Additionally, more inclusiveness within AMT programs has led to a higher completion rate for female AMT students. This data from the research instrument agrees with the 80 percent of participants

who strongly agreed that male and female AMT students have the same opportunities to succeed. This data complements and adds to the studies by William & Rhoades (2006) and Kinane (2010) on the importance of aviation maintenance collegiate programs in helping reduce the shortage of qualified AMTs. Changes concerning gender in aviation have been slow. Still, organizations like the University Aviation Association (UAA) (which accredited the participating schools for this study), the Association of Women Aircraft Mechanics (AWAM), and Women In Aviation (WAI) have helped in closing the gender gap for female AMTs. Recently the researcher attended an online Zoom conference sponsored by the UAA, the "Power of 4: Women Making Strides in Aircraft Maintenance" (The Power 4: Women Making Strides in Aviation Maintenance, 2022). It was about four women in the aviation industry as FAA-qualified AMTs for many years, discussing the many barriers they had met during their careers. During the question/answer portion of the presentation, one question was, "What can AMT schools do better to close the disparity between male/female AMTs?" One of the responses was to get more women who have broken through the barriers to an AMT career involved to help future female AMT students to realize that aircraft maintenance is a viable career choice for women. It is more so than an occupation as a pilot, which requires more time to achieve. Another response was, "Schools need more grant money to promote AMT careers to females." UAA forums like "The Power of 4" can help impact the future of women pursuing satisfying careers as AMTs, along with helping reduce the AMT shortage. WAI has also been a forward thinker and significant player in advocating for more women in the aviation industry. A positive way WAI has helped support an aviation career for women is through events like "Girls in Aviation Day." The researcher recently

participated in Girls in Aviation Day in Tulsa, Oklahoma, in April 2022. This event connected WAI, American Airlines, and Oklahoma State University-Tulsa by attracting more than 100 girls interested in possible futures within the aviation industry.

Lastly, the AMT directors/faculty that responded to the research instrument 100 percent strongly agreed there is a growing need for qualified AMT technicians since AMT schools are the starting point in the United States. This response solidifies that there is awareness at the academic level that their programs could be instrumental in helping fill the demand for qualified AMTs, including female AMTs. This awareness by the directors/faculty reiterates the prediction by the United States Labor Statistics, 2021, which was before the Covid-19 pandemic. Post Covid-19 has created a more significant need for qualified AMTs due to early retirements by more senior AMTs within the aviation industry.

During the researcher's professional career as an AMT for 37 years between the military and a major United States airline, the research has found the findings identical to the researcher's experience reflecting the underrepresentation of female AMTs. In 1983 at the start of the researcher's career on the flight line in the United States Air Force at Carswell Air Force Base; Fort Worth, Texas, out of 300 aircraft mechanics, there was ten (three percent) female. By the end of the researcher's AMT career working for a major airline in 2020, out of 300 aircraft mechanics, there was fifteen (5 percent) female, slightly more than the figures by Bjerregaard, 2021. The increase in female AMTs from 1983 to 2020 is nearly double, but it is still unacceptable. The researcher hopes that the findings from this inquiry bring encouragement going into the future to close the

underrepresentation gap women AMTs have experienced and build on the momentum to lead females to rewarding AMT careers.

Recommendations

With regard to the data and conclusions from this study, the researcher makes the following recommendations:

Recommendation 1:

The formation of more partnerships between AMT programs, organizations like WAI, AWAM, OBAP (Organization of Black Aerospace Professionals), and major airlines could lead to more females aspiring to be AMTs. In this study, one of the participants replied that a specific initiative for recruiting was using Women in Aviation as a catalyst. The researcher agrees and recommends expanding this action. Additionally, Girls in Aviation Day national events sponsored by WAI have been instrumental in exposing young ladies to various occupations within the aviation industry. Building on this momentum could be a possible solution to an increase in more females becoming AMT students. This increase could also close the disparity of male/female AMTs within the airline industry if major airlines partnered with academic AMT programs and organizations like WAI/AWAM/OBAP. A prime example of this type of partnership can be found in OBAP (Tulsa - ORGANIZATION OF BLACK AEROSPACE PROFESSIONALS, 2022), which conducted an aviation summer camp recently in Tulsa, Oklahoma. The camp connected Tulsa Technology's aviation program with Oklahoma State University, American Airlines, Southwest Airlines, Priester, and the United States

Air Force. This camp also exposed middle and high school students to various aviation careers, including aircraft maintenance

All participants in this study were accredited by the University Aviation Association (UAA), which has partnerships with WAI, OBAP, and AWAM. These organizations have sought the advancement of women within the aviation industry. The importance of more partnerships between AMT programs and groups like AWAM is that AWAM addresses specific issues related to female AMTs. Addressing these issues within the partnership could lead to more women desiring careers as AMTs within the airline industry.

Recommendation 2:

AMT programs need to continue communication with local high schools, promoting the idea that males/females can have the same opportunities and enjoy rewarding careers as AMTs. In section three of the research questionnaire, 30% of the participants mentioned that recruiting from local high schools was an activity their AMT program pursued. Students formulate and envision career paths during their high school years and explore their educational options to make that career a reality. Exposing female high school students to AMT programs at a young age when they seek possible career options could lead to greater enrollment. More females in AMT programs could close the gender gap between male/female AMTs in the airline industry.

Recommendation 3:

Expand scholarship programs to attract more female AMT students and women of color. Scholarships are vital for women seeking careers in traditionally male-dominated occupations. Expansion of more scholarship opportunities for female AMT students and women of color could lead to a more significant percentage of women seeking a satisfying career in a high-wage career field like an AMT.

Recommendation 4:

Increases participation by AMT programs to hold Rosie the Riveter-type days for females only. "Rosie the Riveter" was an iconic World War II image of how women could perform in occupations like aircraft maintenance when it wasn't culturally acceptable. Since 2017, the United States Congress March 21 21 of each year as Rosie the Riveter Day has been dedicated to promoting women toward high-wage trades like being an AMT (Chun-Hoon, 2022). AMT academic programs that establish/organize "Rosie the Riveter Day" events could observe a greater enrollment of female AMT students. Also, creating a Rosie the Riveter day could help change the culture of a career field Recommendation 5:

AMT programs working with United States airlines must incorporate marketing strategies to women previously implemented by the United States military, especially the United States Air Force. Incorporating these strategies could fill the need for more AMTs and close the gender disparity gap.

According to the Government Accounting Office (GAO) report GAO-21-61 published in the year 2020, the United States military female active duty personnel

percentage increased to a total of 16.5 percent in the fiscal year 2018, with the Air Force having a higher rate of females of all branches with 20 percent (Office, 2020). There are published articles by military personnel which revealed higher percentages of female aircraft mechanics in the Air Force than the 3 percent at United States airlines previously written in Chapter 1, page 1. The 402nd Aircraft Maintenance Group at Robins Air Force Base, Georgia, had 8 percent female aircraft mechanics (Gordon, 2015), and the 97th Air Mobility Wing at Altus Air Force Base, Oklahoma, had 21 percent female aircraft mechanics within the unit (Klemm, 2021). A common thread revealed in both articles was the military allowed a platform for women mechanics to thrive because they were treated as equal to men in the mission requirements. Also, through military diversity initiatives, women aircraft mechanics felt their voices had been equally heard, which brings different viewpoints from both men/women in solving problems like the "Women of Maintenance" committee at Hulbert Field, Florida (Mahoney, 2021).

Additionally, since the first recognition of International Women's Day, which was passed in 1987 by the United States Congress, the United States military has made significant gains in empowering women to roles traditionally held by males in the past. The United States military has made International Women's Day a focal point to acknowledge/celebrate contributions from women in history, along with expanding women's roles in the military in the future. Female aircraft mechanics in the United States Air Force noted the importance of mentoring new females that enter the Air Force along with the satisfaction of rewarding work experience, growing as a human, and inspiring future females to walk the same path as aircraft maintainers (Sestanovich, 2021). predominantly employed by males and change women's lives for a better financial future.

Future Research

1. Research impact and social media's role help encourage the future generation of female AMTs. Social media has been an impactful tool for organizing people's awareness of issues people desire to transform from the status quo. An interesting study would investigate how social media platforms like Instagram/Facebook empower and break down stereotypes (if at all) for women seeking a career as an AMT. Social media has shown to be a proven tool for activism regarding women's issues, even amid a pandemic (Brar, 2020), with positive results for real change.
2. Inquire about the creation/impact of mentorships between women AMTs in the airline industry participating in organizations promoting these mentorships. A good model for these mentorships can be found in the Canadian organization North Lights Aero Foundation. Northern Lights Aero Foundation seeks out experienced women with established aviation careers in various occupations like AMT to attract future generations of women looking for a rewarding career in aviation (Northern Lights Aero Foundation – Women. Aerospace. Aviation, 2022). These experienced female aviation professionals are then paired into a mentoring relationship with female aviation students or prospective students to guide along and encourage them through the process that, in the end, is an aviation career.
3. Explore more in-depth solutions that could break down stereotypical obstacles for females who desire a career as an AMT. Men and women have different life experiences, strengths, and weaknesses, but working together

without being stereotyped can help form a healthy workplace environment. Brown, A. (2022) illustrates how education and understanding in the workplace can lead to more harmonious relationships, breaking down gender barriers which could help solve some of the issues for women AMTs within the aviation industry

4. Explore in-depth solutions that could attract more women of color students to AMT programs. Delta Airlines has created a pipeline strategy for aviation maintenance training that has attempted to be a solution to breaking down barriers that attract not only women but women of color (Bloom, 2019). This solution is worthy of further inquiry for academic AMT programs and the US airline industry

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APPENDICES

Appendix A

Research Instrument

Research Instrument

Closing the Disparity Gap: ***Reimagining the Airline Industry with More Female Aviation Maintenance Technicians***

Please answer all questions to the best of your ability. Your responses are **confidential.** Thank you.

This study aims to evaluate how United States university, college, and technical school's Aircraft Maintenance Technology (AMT) programs address the under-representation of female aircraft maintenance technicians at airlines in the United States.

I. Characteristics of University, College, or Technical School

1) In which State is your university, college, or technical school's Aircraft Maintenance Technology (AMT) program located?

2) Is your AMT program a two-year, four-year, or other program?

[ ] 2-year program [ ] 4-year program [ ] other

3) How many of your current students are majoring in AMT?

(Please enter number of students.)

4) What percentage of your current AMT students are female?

(Please enter 0-100 percent)

5) What percentage of your current female AMT students are women of color or minorities?

(Please enter 0-100 percent)

6) What percentage of your female AMT students complete the program?

(Please enter 0-100 percent)

7) What percentage of your current AMT faculty are female?

(Please enter 0-100 percent)

II. Perceptions of Your University/College Aviation Maintenance Technology Program

8) In your opinion, there is a growing need for qualified AMT technicians in the United States.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

9) In your opinion, there is an under-representation of female AMT students at your institution.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

10) In your opinion, AMT programs equitably recruit male and female students.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

11) In your opinion, AMT programs provide male and female students the same opportunities to succeed.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

12) In your opinion, AMT programs provide adequate scholarships to attract female students.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

13) In your opinion, AMT programs create appropriate cultural conditions to help retain and graduate female students.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

14) What is the total amount of scholarships (in Dollars) provided to female AMT students in your program in the last three years.

(Please enter dollar amount)

15) In your opinion, AMT programs adequately support diversity and inclusiveness initiatives.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

16) In your opinion, AMT programs are actively identifying solutions to close the disparity between male and female aviation maintenance technicians at United States airlines.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

III. Additional Comments

What specific initiatives is your institution taking to recruit female AMT students?

Appendix B

Recruitment Email

Dear Aviation Director/Faculty:

I am conducting a national research study designed to evaluate how United States university, college, or technical school aircraft maintenance technology programs are addressing the underrepresentation of female aircraft maintenance technicians at airlines in the United States. This study's long-term goal is to identify/resolve issues linked to the gender disparity among Aviation Maintenance Technology (AMT) to better represent women as licensed airline mechanics in the United States.

AMT program directors and or faculty at United States universities, colleges, and technical schools offering two-year or four-year AMT programs with accreditation by University Aviation Association will be the research population for this inquiry. The participants will complete a brief 10 minute online research instrument emailed via an anonymous link through Qualtrics Statistical software titled *REIMAGING THE UNITED STATES AIRLINE INDUSTRY WITH MORE FEMALE AVIATION MAINTENANCE TECHNICIANS*. The information given by participants is voluntary and confidential. Your willingness to participate in and support this research study is greatly appreciated. *Oklahoma State University, Office of University Research Compliance, has approved this research study (IRB Protocol: IRB-22-23).*

I sincerely request your participation in this national research study.

If you have questions or concerns, please do not hesitate to contact me.

Respectfully,

Harley Thomas
Oklahoma State University
Aviation Education Doctoral Student
harley.d.thomas@okstate.edu
(918) 527-3718

Appendix C

Approval of IRB Application

Oklahoma State University Institutional Review Board

Date:	01/20/2022
Application Number:	IRB-22-23
Proposal Title:	REIMAGING THE UNITED STATES AIRLINE INDUSTRY WITH MORE FEMALE AVIATION MAINTENANCE TECHNICIANS
Principal Investigator:	Harley Thomas Jr
Co-Investigator(s):	
Faculty Adviser:	Mallory Casebolt
Project Coordinator:	
Research Assistant(s):	
Processed as:	Exempt
Exempt Category:	

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

collapse

Study:	**IRB-22-23**	**Sponsor(s):**	*No Sponsor* (Primary)
Committee:	IRB	**Sponsor Id:**	
Category:	College of Education and Human Sciences	**Grants:**	
Department:	Aerospace Studies		
Agent Types:	Surveys/Questionnaires (Internet)	**CRO:**	
Title:	REIMAGING THE UNITED STATES AIRLINE INDUSTRY WITH MORE FEMALE AVIATION MAINTENANCE TECHNICIANS	**Year:**	2022
Exempt Categories:	New Category 2: Research that only includes interactions involving educational tests, survey procedures, interview procedures, or observation of public behavior if at least one of the following is met - anonymous, disclosure would not cause harm, or identifiable with limited IRB review completed.	**Number of Approved Subjects:**	49
Review Level:	Exempt		
Comments:	This study is to evaluate how United States university, college, or technical school aircraft maintenance technology programs are addressing the under representation of female aircraft maintenance technicians at airlines in the United States.		

Study-Site

Site(s):	**OFF - Off Campus Location**	**PI:**	**Thomas Jr, Harley**
Status:	Open to Enrollment	**Additional:**	N
Approval:	January 20, 2022	**Expiration:**	**Exempt**
Initial Approval:	January 20, 2022	**Other Expirations:**	Exempt check in date - 01/19/2025
Location(s):	Internet/Online Only		
Comments:			

Study-Site Contacts (1) collapse

Name	Role
Casebolt, Mallory	Faculty Advisor

Events (1) collapse

Appendix D

Participant Research Informed Consent Form

College of Education and Human Sciences Aerospace Studies

Participant Research Informed Consent Form

REIMAGING THE UNITED STATES AIRLINE INDUSTRY WITH MORE FEMALE AVIATION MAINTENANCE TECHNICIANS

Background Information

You are invited to be in a research study to evaluate how United States university, college, or technical school aircraft maintenance technology programs are addressing the underrepresentation of female aircraft maintenance technicians at airlines in the United States. Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time. You can skip any questions that make you uncomfortable and stop the survey anytime. Your decision whether or not to participate in this study will not affect your relationship with the researcher.

This study is being conducted by:

Harley Thomas
(918) 527-3718
Oklahoma State University-Aviation Education Doctoral Student
harley.d.thomas@okstate.edu
and under the direction of Oklahoma State University academic advisor Dr. Mallory Casebolt at (918) 594-8496; or her email mallory.casebolt@okstate.edu.

Procedures

If you agree to be in this study, we would ask you to do the following things:
Participants (Aviation Directors/Faculty) in this study are asked a series of 17 Likert Scale questions administered by an emailed anonymous link via Qualtrics Statistical software covering demographics and characteristics of their perspective university/college/technical schools. The research questionnaire also has a section for personal comments.

Participation in the study involves the following time commitment: The total time to fill out this research questionnaire should be 10 minutes or less.

Compensation

No compensation for participation in this study.

Confidentiality

Please do not write any identifying information.

The information you give in the study will be anonymous. This means that your name will not be collected or linked to the data in any way. The researcher will not be able to remove your data from the dataset once your participation is complete.
The researcher works to ensure confidentiality to the degree permitted by technology. Although unlikely, unauthorized individuals could possibly gain access to your responses because you are responding online. However, your participation in this online survey involves risks similar to a person's everyday internet use. If you have concerns, you should consult the survey provider's privacy policy at https://www.qualtrics.com/privacy-statement/.

Contacts and Questions
The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about the research study, please contact the Principal Investigator at (918) 527-3718 or harley.d.thomas@okstate.edu. If you have questions about your rights as a research volunteer or would like to speak with someone other than the researcher about concerns regarding this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.

Statement of Consent
I have read and understand the provided information and have had the opportunity to ask questions. I know that my participation is voluntary and that I am free to withdraw at any time without giving a reason. I voluntarily agree to participate in this study and, by doing so, give my informed consent.

VITA

Harley Dee Thomas Jr.

Candidate for the Degree of

Doctor of Education

Dissertation: REIMAGING THE UNITED STATES AIRLINE INDUSTRY BY INCREASING FEMALE AVIATION MAINTENANCE TECHNICIANS

Major Field: Applied Educational Studies, Aviation & Aerospace Option

Biographical:

Education:

Completed the requirements for the Doctor of Education in Applied Educational Studies, Aviation & Aerospace Option at Oklahoma State University, Stillwater, Oklahoma in December, 2022.

Completed the requirements for the Master of Science in Aviation and Space at Oklahoma State University, Stillwater, Oklahoma in May, 2020.

Completed the requirements for the Bachelor of Science in Aviation Management at Oklahoma State University, Stillwater, Oklahoma in May, 2019.

Completed the requirements for Associates in Liberal Arts at Tulsa Community College, Tulsa, Oklahoma in May, 2019.

Completed the requirements for Associates in Aviation Maintenance Technology at Eastern New Mexico University, Roswell, New Mexico in May, 2016.

Experience: Adjunct Professor at Oklahoma State University-Tulsa for undergraduate courses: Aviation Safety, Aviation Management Principles, Accident Investigation, and Aviation Finance.

Professional Memberships: Member of Women in Aviation (WAI) and Association of Women Aircraft Mechanics (AWAM)