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Women in Aviation: A Phenomenological Study Exploring the Needs and Wants Necessary for Graduation

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Despite the increased awareness of gender and race equality movements, today's population of minority women in aviation is still underrepresented. This research focused on underrepresented minority women who want to pursue a career in the aviation field and what factors affect their level of success in a specialized aviation higher education institution. There is not enough data and research surrounding the topic of minority women in aviation and their paths to success in these institutions. This qualitative research aimed to bridge the existing gap in the literature related to minority women in aviation and their needs and wants to complete a four-year degree. The research objective was to raise awareness for equality of race and gender in aviation higher education institutions and explore the needs and wants that could lead to academic success for minority women. The qualitative research design brought in six students who identify as a minority woman defined by conditions set upon by the researchers, and they were asked a list of questions in a semi-structured interview format. The qualitative data collected from in-depth interviews helped identify significant aspects and patterns that minority women in aviation recognize as needs and wants that could lead to academic success. Open communication, friendship and community, and positive faculty support were identified as the perceived needs and wants of minority female students in aviation. These findings can be used to better serve underrepresented students in an aviation specialized higher education institution. In conclusion, the findings can be used to bring awareness on an issue that is not widely studied or discussed in educational aviation institutions.

Numerous studies have explored race and gender inequality issues in four-year degree institutions and factors that affect student attrition rates. However, there is scant literature on underrepresented female minorities in aviation-specific institutions that confer a four-year degree for aspiring pilots. This study was framed using Derrick Bell's (1973; 1995) critical race theory (CRT) and John Bean's (1980) theory of student attrition. The present study focused on minority female students who were enrolled in an aviation four-year degree, and how they define their college career needs and wants to achieve success. At this stage in the research, *underrepresented minorities* are defined as individuals who do not identify as Caucasian. Furthermore, in an effort to increase research inclusion and minimize discrimination among the sample population, both *cisgender* and *transgender* women were part of this study. The term cisgender refers to those individuals whose sense of personal identity correspond with their birth sex, and the term transgender refers to an individual's whose sense of identity does not correspond with their birth sex. This study proposes further research to be conducted in order to address the issue of gender and race inequality that still exists in modern higher education institutions and especially those with an aviation focus.

Background

The term minority refers to the implication that there is a significant lack of numbers within a grouping of people (Pawley, 2019). The word minority could also be interpreted as the lack of power of a group that experiences some level of discrimination, which is more applicable to this study. According to Omi and Howard (1994), minority groups experience unequal treatment which impact a significant aspect of their lives. Inequality can be observed through a historical perspective, with predominant examples being slavery and segregation. The contemporary human rights movement is paired with the civil rights movement, both focusing efforts into combating any form of oppression and discrimination (Anti-Defamation League n.d.; United Nations n.d.). In these events, discrimination was present based on race and ethnicity. Although both slavery and segregation have been abolished, unequal representation of minority groups and bias towards minority members is, to this day, present in our society (Pawley, 2019; Rask, 2010). More actions are being taken to combat the effects of past discrimination in job hiring practices and college application acceptance. Affirmative action refers to deliberately choosing to hire or select candidates of individual races who have previously been discriminated against (Gaskill, n.d.). For example, it is commonly seen in applications where the applicants are asked to report their race and ethnicity.

The present study enables the understanding of the needs and wants of women in aviation in several ways: as a contribution to the literature about adult females' experiences in aviation education working towards completing a four-year degree; as a qualitative phenomenological study in aviation higher education; and, as an aspect of students' professional development with regards to retaining minority females in aviation education programs.

Literature Review

This review of the literature analyzes and identifies relevant theories and gaps in the existing literature. Limited literature regarding underrepresented aviation female students in a

collegiate setting has been identified as the existing gap. This literature review expands the examination of underrepresented students in the context of other science, technology, engineering, and mathematics (STEM) fields. The guiding theories of this literature review are those of Derrick Bell's (1973; 1995) critical race theory (CRT) and John Bean's (1980) theory of student attrition.

Bell's (1973; 1995) critical race theory (CRT) focuses on racially motivated injustice while removing religious and ethnic inequalities. The use of the CRT as a theoretical framework enabled the researchers to understand the essence of achievement for racial minorities and, therefore, can be applied in higher education institution (HEI) research (Crenshaw, Neil, Gary & Kendall, 1995; Gillborn, 2006). In recent years, HEIs have focused on diversifying their students and faculty to better serve the more globalized professional industries and their interest in campus diversification (Hurtado & Ruiz Alvarado, 2015; Luedtke, 1994). It is essential to be aware of this increasing trend and create a suitable setting for minority students to obtain higher education in a safe and welcoming environment (Aljohani, 2016). On the other hand, some institutions seem to only improve the face-value of the school by artificially diversifying its pool of students. However, it is shown that the rate at how the traditionally underserved students (TUS) succeed and complete their degrees should be the focal point, rather than the number of TUS who attend a particular school (Gillborn, Warmington, & Demack, 2018). The number of TUS was observed to be much higher in HEI, specifically institutions focused on STEM majors (Bancroft, 2018; Ong, Smith, & Ko, 2018).

Furthermore, minority female students in aeronautical science and flight degree programs are deeply underrepresented, even though they make up for a significant number of the student body (Meyer, Cimpian, & Leslie, 2015). Due to the lack of underrepresented female minorities' studies in aviation, some aviation-specific HEIs are unable to analyze its body of TUS and their learning environments correctly. It is challenging to critically assess how gender and race operate in the field of STEM as these education systems and class differences have already been established for decades (Pawley, 2019).

The theory of student attrition focuses on the retention rate of students enrolled in HEI and the factors that affect their decision to stay enrolled or drop out (Bean, 1980; Bean & Metzner, 1985; Spady, 1971; Tinto 1975). There has been an increasing demand and interest in developing models and theories that explain the factors affecting student dropout (Mannan, 2007). One area of interest for policymakers, researchers, and educational leaders is improving the low retention and graduation rate of STEM fields. Early withdrawal from HEI can be strongly associated with academic-related skills and how the students adapted to academic and social life. Factors such as academic preparedness, academic experiences, institutional expectations, academic and social match, family support and commitment, and university financial support services are identified as critical influencers to a student's ability to complete a degree (Webb & Cotton, 2018). In the readily evolving global labor market, studying how student attrition differs in aviation-specific HEI could become valuable not only to the university's marketing and recruiting practices, but it is also set in the right direction. If these factors can be clearly identified and labeled, HEI can increase institutional commitment to students; therefore, decreasing the level of dropout of TUS (Bean, 1980; Bean & Metzner, 1985). The student attrition theory in this study provides a theoretical foundation and structure for

explaining minority female aviation students' ability to succeed in an industry dominated by males while increasing their retention rate.

Historically, female and black pilots were segregated since World War II (Vaughan, 2016). The world witnessed a great increase in demand for pilots as technology developed over the years, and more people were traveling in the air. General aviation was a small portion of the industry that allowed females to learn how to fly and enter this prestigious workforce (Bednarek & Bednarek, 2003; Ison, Herron, & Weiland, 2016). More female pilots were certified after World War II, and along with opportunities from the Air Force and the space program, the number of female pilots grew steadily (Luedtke, 2011). Amelia Earhart is undoubtedly one of the most influential figures in aviation history, but the list of important female pilots is much longer.

There is an evident connection between race and gender, and student attrition rate in HEI. Historically, females have been underrepresented in aviation, and their numbers remain on the lower end (Ison et al., 2016; McCarthy, Budd, & Ison, 2015). Aviation HEIs should become concerned regarding neutralizing racism on campus and increasing student retention rates (Bancroft, 2018; Ong et al., 2018; Rask, 2010). It could be argued that there is a demand for increased awareness of gender and race-related issues on aviation HEIs, which could provide a safer and more welcoming environment for students. A further continuation of research into the field of aviation-specific institutions will enhance the understanding of student attrition in STEM majors as well as for the more specific and global market of aviation. By understanding the deeply rooted impact of race and gender on student attrition rate, the presence and representation of female pilots in the aviation industry can be positively improved for the future generation.

Significance

The findings of this study are important for society, as the emphasis on diversity and the role of minority members continue to increase. Research has shown that there have been a limited number of studies that focus on minority women's experience in college readiness and the factors that affect their academic progress (Bednarek & Bednarek, 2003; Luedtke, 2011). This study focused on minority women, specifically in aviation specialized HEIs who are pursuing flight training. Thus, schools with a specialized emphasis on aviation, and other related STEM degrees, will be able to use the findings of this study in order to better serve TUS. Furthermore, the present study can be used as a tool to bridge the existing gap in the literature related to minority women in aviation, and their needs and wants to complete their four-year degree.

Problem Statement

Recent studies in the field of aviation show that there is limited data or research surrounding the topic of minority women in aviation and their paths to success in HEIs (Bancroft, 2018; Ong et al., 2018). This qualitative research aimed to bridge the existing gap in the literature related to minority women in aviation and their needs and wants to complete their four-year degree. The objective of this research was to raise awareness for equality of race and gender in aviation HEI and to explore factors that could lead to academic success for minority women in aviation.

The research question driving the study was:

- How do minority women in aviation define their needs and wants to achieve success and complete their four-year degree?

Methodology

According to Creswell & Poth (2018), qualitative research allows the researcher the opportunity to explore the data and formulate an understanding. Furthermore, qualitative research is used to "make sense of and recognize patterns among words in order to build up a meaningful picture without compromising its richness" (Leung, 2015, p. 324). Therefore, rather than striving to achieve generalizability in the findings, phenomenological qualitative research strives to add extra dimensions and perspectives to the corpus of findings through rich descriptions of the lived experiences (Creswell & Creswell, 2018; Creswell & Poth, 2018; Moustakas, 1994). This study aimed to build a depth of understanding around minority women's success in their aviation college career. The foundational structure of the research revolved around the guiding theories of CRT and the student attrition theory. A qualitative phenomenological approach was the most appropriate because it is important to understand the common and shared experiences of several individuals regarding the phenomenon in question (Creswell & Creswell, 2018). Moustakas (1994) also pointed out that phenomenology seeks meanings from appearances and arrives at essence through intuition and reflection of conscious acts of experience. The literature supports a gap in research regarding the factors that influence minority females to succeed in their aviation college careers. The primary data collection was done through semi-structured interviews. The interview questions were validated by a former female airline pilot and aviation professor whose subject matter expertise is in diversity and inclusion in aviation education. Table 1 shows the interview questions developed for this study.

Table 1
Interview Questions

1) Tell me about yourself.
a)   Born and raised
b)   Background
c)   Race identification
2) How the faculty interactions helped you persist to complete your aviation degree?
3) What are your perceptions of minority women in completing a four-year degree?
4) What factors do you think contributed to minority women being underrepresented in the aviation field?
5) What strategies or skills do you perceive were necessary to be successful in the aviation higher education system?
6) How has being a minority woman in a four-year aviation college affected your ambitions for your future?
7) What are your plans after obtaining your bachelor's degree in aviation?
8) What are your recommendations for improving the success rate of minority women completing their four-year degree in aviation?
9) What factors kept you motivated to complete your four-year aviation degree?
10) How do you define success in college?

Because Creswell and Creswell (2018) suggest a purposeful sampling for qualitative research, participants included six aviation senior undergraduate female students from an aviation HEI located in Florida who identified themselves as underrepresented minorities.

Furthermore, the objective of this research methodology was not to yield generalizable results, but to generate an understanding of the lived experiences of the participants (Creswell & Poth, 2018) and to lay a foundation knowledge for future research explorations in aviation education.

Participants

The sample for this qualitative research followed Creswell and Poth's (2018) small sampling suggestion in order to support the depth of phenomenon-oriented analysis that is fundamental to this mode of inquiry. This research focused on six self-identified cisgender or transgender females enrolled in a four-year degree program. Participants were full-time undergraduate aviation students. Furthermore, these participants were seniors and had attended at least two semesters at the research site. Participants were asked to disclose their ethnicity, which was broken down to Asian, Black, American Indian /Alaska native, Hispanic or Latino, Native Hawaiian or Pacific Islander (see Table 2).

Table 2
*Participants Demographics (*Pseudonyms)

Name	Ethnicity	Age
Diana	Asian	21
Linda	Asian	21
Lois	Hispanic	22
Marge	Hispanic	20
Peggy	Asian	21
Penelope	Asian	20

Setting

The participants of this research are students of an aviation-specific HEI located in Florida. Around 70% of this institution's student body is made up of male students, so due to the evident nature of the institution, the number of minority female students is low.

Due to the Covid-19 pandemic, interviews were scheduled and conducted online via Zoom conference calls. These video conference calls allowed the interviews to be conducted at a time that was convenient for both the researcher and the participant in their own space. The recordings of each interview remained confidential and secured for data analysis.

These interviews were scheduled in advance and were around 30-40 minutes. The primary researcher conducted the interviews through an online Zoom conference call with the supporting researcher present as a secondary line of contact in case the call experienced technological difficulties. As mentioned before, the primary researcher did experience some internet connection issues where the researcher's mic was briefly cut out, and the supporting researcher was able to fill in the missing portion to prevent confusion.

Recruitment Process

Participants were selected via purposeful sampling. The supporting researcher used an internal student demographics list to identify self-identified minority females in the aviation program of the research site. The supporting researcher compiled a list of potential candidates

and sent it to the primary researcher. Eleven participants received a recruitment email from the primary researcher extending an invitation to participate in the study; only 6 replied showing interest. Each email had the consent form attached to it. They were asked to sign an online interest form for basic information and an informed consent form to agree to the conditions. This research was sponsored by the Embry-Riddle Aeronautical University (ERAU) Summer Undergraduate Research Fellows (SURF) program. Furthermore, the research was approved and reviewed by the ERAU Intuitional Review Board. Participants were informed that their names were going to be entered in a random drawing for the chance to win a one hundred dollars for their participation. When the participant showed interest by completing these two documents, a separate email was sent to schedule the time and to inform the process to conduct the interview via Zoom.

Data Analysis

The data analysis was conducted as an ongoing process. As soon as individual interviews were completed, the researchers transcribed them and sent them back to the participants for review and approval. After approval from each participant, the researcher engaged in data analysis. The data was coded manually so that the primary researcher was forced to think and deliberate, generate codes, and reject and replace them with others that were more illuminating and which seem to explain the phenomenon better (Creswell & Poth, 2018). As suggested by Moustakas (1994), the researcher engaged in an epoche process so that they were able to actively listen, observe, and interact with the data through the lived experiences of the participants. First, coding was used to identify *significant statements* that were made by the participants. Significant statements were identified and clustered into themes (Creswell & Creswell, 2018). As themes emerged and duplicated, they were reduced to construct the essence of the experience (Creswell & Poth, 2018) and were analyzed in the context of the CRT and the student attrition theory. Focus on textual descriptions of the lived experiences provided the *what* of the phenomenon. Once the phenomenon was identified through the participants' own words, they were used to answer the research question. It is important to point out that as part of the data analysis, the term *needs* was defined as the elements that students must have accessible; while *wants* was defined as self-perceptions of what needs to be accessible.

To ensure the trustworthiness of this qualitative research study, member checking procedures and external peer review were utilized. Creswell and Poth (2018) affirmed that member checking enables researchers to solicit the participants' views of the credibility of the findings. All participants had the opportunity to review the transcripts of their interview responses to ensure accuracy. Furthermore, the researchers followed Creswell and Creswell's (2018) suggestion of seeking a peer review external to the research to ensure the integrity and accuracy of the research. The external peer review member was a female aviation professor whose subject matter expertise is in diversity and inclusion in aviation education.

Findings

To answer the research question, information collected from the personal interviews was analyzed, and themes were developed from recurring codes to describe how the participants defined their college career needs and wants to achieve success in the aviation education field.

Epoche was the primary strategy used by the researchers to bracket their experience with the topic of study to fully examine the participants' perceived needs and wants. Moreover, the researchers then used phenomenological reduction in order to develop meaning from the text (Creswell & Creswell, 2018). After significant statements across participants were clustered together, three major themes emerged that answered the research question (see Table 3).

Table 3
Open Codes and Themes

Open codes	Appearances across data sets	Category
Goal Sharing	19	Open Communication
Opinions	16	
Stereotype	15	
Culture	10	
Connections	8	
Network / networking	8	
Respect	7	
Obstacles	5	
Appealing	4	
Intimidating	4	
Perspective	4	
Communication	3	
Family & friends	44	Friendship and Community
Motivation	22	
Female pilot	21	
Women in Aviation	14	
Community	13	
Representation	7	
Relationships	5	
Scholarships	4	
Professor(s)	45	Positive Faculty Support
Support	44	
Experience	36	
Knowledge	18	
Career	15	
Opportunity	12	
Interaction(s)	11	
Environment	8	
Participation	8	
Role model(s)	8	
Involvement	7	
Mentorship	6	

Theme 1: Open Communication

The most prominent theme that emerged during this study was open communication. Communicating one's ideas to professors, classmates, and family members can be challenging as it requires a specific means of communication. The participants in this study seem to agree with the fact that being able to ask questions and receive answers enables them to achieve success. Penelope best exemplified this ideal when she stated,

> I go to office hours a lot because I'm always searching for human interaction and just a lot of advice. I'm always trying to find advice in my life path because all of our professors pretty much have experiences in the industry.

Moreover, the participants' responses seem to support the fact that strong and open communication is a cornerstone of success in academia. Evidently, open-communication empowered this group of females to get to know other females and male-peers on a personal level, boosting their confidence towards achieving the completion of their degree. Diana explained that the definition of success in college could be seen as the connections she has made and the life-long relationships she has built during college. Furthermore, Linda confirmed when she commented that, "a successful college experience is looking back and reflecting on the friends that you've made, and the connections you have acquired." Students seem to value an open environment for communication and support validation.

Students seem to utilize their professors' office hours and normal class interactions in forms of meaningful discussions. The ability of faculty to provide a safe environment for students to share their concerns and thoughts determined the level of comfort of the student, which led to their greater success (Webb et al., 2018). Open communication not just among peers but with instructors and professors can lead to the student developing life-long connections with them. Lois stated, "we still keep in touch and he's just always giving advice and insights to his career, and if I ever needed help with anything, he'd always be lending a hand to help." Open communication between the students and the faculty, as well as among peers in a classroom setting, can create in-depth connections within the aviation industry (Webb et al., 2018). Students want more platforms and methods to voice their opinions and concerns regarding their education and flight training.

Theme 2: Friendship & Community

Another powerful theme that emerged was friendship and community. There is great power in building a support system among peers. The females in this study felt that building strong friendships and developing a sense of community enable them to be successful in attaining their aviation degree. Peggy stated that, "encouragement from my family, my friends, definitely helped me keep going and helped me stay strong." Many students rely on their friends for moral support and advice on personal and academic decisions (McCabe, 2016). Marge, for example, believes that a strong support system among friends can lead to a higher retention rate. Marge also stated,

> "a lot of influence comes from your friends. But I think the support system for people in the retention rate is very, very important because when you're at a low point in your life, you go to your peers, you go to your friends."

For these female students, the aviation industry is still very much dominated by males; therefore, a strong sense of community within their education institution makes them feel safe and included. Diane further recognized that, "the people around me study very hard, ask questions, help each other, willing to support people around them all." Her community of peers motivated her to persevere through tough courses. Linda confirmed that communities such as

Women in Aviation are "good platforms to find role models like you get to hear stories about like multiple women." For female aviation students, the need for a sense of belonging is considered an important factor for emotional support. Linda also expressed that "being a part of a bigger community where you have people just like you, it's motivating." Mutual goals and aspirations seem to reach out to other students if they are part of a community at a higher education institution.

Theme 3: Positive Faculty Support

The last major theme that emerged was positive faculty support. Females entering the aviation field are initially looking for guidance, someone who can encourage, motivate and talk them through any questions they have. Linda shared,

> I had zero clue of what the aviation industry was like. I just knew I wanted to fly. Having faculty members willing to support my learning needs made training and academics much easier. My faculty advisor made me feel welcomed every time, almost as if there was no gender needs inequality in aviation.

When students find someone they can connect with, someone who is positive and encouraging, they feel more at ease (McCabe, 2016). It appears that female students in aviation at this particular site needed and wanted faculty capable of guiding them through the intricacies of their new experience in a way that is exciting, comforting, and relatable to the aviation industry. Diane explained that "all my aviation professors were caring and friendly. Their genuine desire to see me succeed confirmed that not only was I at the right institution, but also that I chose the right field for me." Providing a sense of direction to female students appears to enable them to take ownership of their academic careers, while boosting their confidence to complete their degree.

All participants highlighted the importance of faculty guidance as it can lead to more opportunities and connections which they think are needed in the industry to succeed. Marge articulated this thought when she explained that her professors "talk a lot about how connections are the way to go and they talked about like the networking side of aviation," which she deemed as an important factor for success. These participants also expressed a clear need for a wide variety of experiences among the faculty as they listen to the stories and the advice from real-life examples. Lois stated that her professors "all had their own experiences with aviation, and they all have a lot of good insight and stories and advice." Despite the research site being aviation-oriented, these participants appreciated the different perspectives gained from a diverse faculty. Faculty support, their knowledge and experiences were mentioned consistently throughout the data set, which shows the importance of this theme as a need and want for minority female students in the aviation.

Limitations

Though conducted with a rigorous qualitative research design, this study was limited by the following factors. First, all participants were from one major aviation higher education institution. Secondly, rather than striving to achieve generalizability in the findings, this phenomenological qualitative research adds extra dimensions and perspectives to the corpus of

findings through rich descriptions of the lived experiences of the participants (Creswell & Creswell, 2018; Creswell & Poth, 2018; Moustakas, 1994). Lastly, while this study concedes that the lived experiences of the participants may not reflect the diverse perspectives of female student enrolled in other aviation higher education institutions, it serves as a foundation to study the different perspectives of different student groups in order to better serve future generations.

Conclusion

From the qualitative data collection, three themes were identified which were open communication, friendship and community, and positive faculty support. Based on these themes, it is evident that some minority aviation female students must fulfill their needs and wants in order to complete their four-year degree successfully. The needs and wants can be subjective, depending on the students' strengths and weaknesses as well as their background. In addition, early exposure to aviation, accessibility to female pilots, role models, and their ability to connect with the faculty is critical for attracting and retaining more female minority students. The underrepresentation of minority females in the aviation industry is a systematic issue that will need to be dealt with over a long period of time. There is no overnight solution because the building of respect, trust, and inclusion takes time, especially for the aviation industry, which has been dominantly homogenous for decades. The current female pilot students truly appreciate and respect the beauty and the nature of flying. Furthermore, their biggest motivation for completing their four-year degree is to be able to fly and make flying a life-long career for them. It is crucial that more female students can find interest and willingness to persevere through rigorous and costly flight training in order to benefit from all the opportunities the aviation industry has to offer.

This research focused on the needs and wants of minority women in aviation for them to achieves success and complete their four-year degree. The study conducted individual, semi-structured interviews with students who are currently attending or have attended an aviation-specific HEI in an attempt to explore their perspective of needs and wants. The research focused on two theoretical frameworks; critical race theory and the theory of student attrition. CRT allowed the researchers to explore factors that impact the low achievement of minority students in HEI and possible changes that can improve their learning environment. The student attrition theory added another layer of complexity as it focuses on retention rate of students at HEI and factors that impact it. The research was conducted as a qualitative study as it was the most suitable method of data collection and the delivery of findings. After the data collection and analysis, the results showed that students value open communication, friendship, and community, and positive faculty support. These themes were identified among the six students who have participated in the interview. This qualitative research aimed to provide a better understanding of the needs and wants of minority women within the aviation industry and aviation education. As the number of female pilots in the industry increases, more role models will emerge; representing a more diversified pool of young and experienced aviators.

Recommendations

The increased awareness of racial equality and social justice demands for changes in the HEIs. For HEIs that deal with a low retention rate of minority female students, future studies can

explore the effects of faculty's academic support on the retention rates. In addition, similar researches can be conducted focusing on different ethnic or social groups on campus that make up the student body. It is critical to study different perspectives of students in aviation higher education settings in order to better serve the diverse student body. Moreover, some of the best practices that higher education institutions and aviation programs could be adopted from this research are: (1) actively promote and foster a welcoming environment in which students are able to build a strong sense of community, (2) sponsor workshops in which both students and faculty member are able to improve their communications skills, (3) survey students to identify the effectiveness of the faculty support and engagement.

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