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An Inquiry into the Aviation Management Education Paradigm Shift

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Cover Page Footnote

Paradigm shifts have taken place within almost all fields of education, to include science, technology, engineering, and math; fine arts; and healthcare (Ahmad, 2009; Panaiotidi, 2005; Stanley & Dougherty, 2010). Historically, education paradigm shifts were focused on curriculum delivery or content. The impact of such shifts can have far-reaching effects on their respective industries. For instance, Stanley and Dougherty (2010) introduced an active learning model that proposed a paradigm shift away from traditional nursing education to one that was more tailored to the younger generation of students that valued their education differently.

The migration from traditional to online learning is another education paradigm shift—one that is still underway. Tech & Learning (2011) cited that 66% of U.S. colleges and universities have some form of online learning modality and further noted that over 3 million students would take classes completely online in 2014. Such a paradigm shift, which has expanded exponentially over the past decade, has shifted dramatically the way students view and complete postsecondary education. The academic pipeline for aviation professionals and the managers who flourish from the graduates of the aviation education pipeline are no exception.

Problem Statement

Carkeet (1980) conducted the first empirical study on aviation leader education; specifically focusing on qualifications that university faculty would need to prepare students for aviation industry leadership. Since then, the aviation industry has evolved considerably, creating literature gaps in the field. Several researchers have addressed aviation in research; however, there is still work to be done and several studies have recommended future research to fill literature gaps. One recommendation has come from a study that investigated aviation managers' perspective on the importance of education. In the aforementioned study, Newcomer, Marion, and Earnhardt (2014) conducted a quantitative analysis of data from 103 aviation managers and discovered that 57% of the sample did not consider their education level critical to obtaining their current position. In the same study, Newcomer et al. discovered that despite managers' opinion that their degrees were not critical to obtaining their position, they did prefer new hires to hold a degree. That unexpected discovery indicated a potential shift in the aviation industry from one where education was not preferred to one where it may be more preferred. Due to the lack of evidence in support of the foregoing, the specific problem explored in this research was the potential paradigm shift and any underlying reason(s) behind such a shift.

Purpose Statement

The objective of this qualitative phenomenological study was to explore the potential aviation education paradigm shift via interviews with aviation industry managers. The interviews served as the conduit to explore the participants' perspectives and experiences thus allowing us to discover if and why the phenomenon existed.

Significance of the Study

The investigation of a potential paradigm shift in aviation management education yielded primary and secondary results that have significant implications to higher education organizations; and the potential hires, current employees, and employers in the aviation industry.

Primary

On average, working adults holding a four-year degree from an accredited college or university earned a salary 2.6 times greater than their counterparts without a degree (Bureau of Labor Statistics, 2014). The discovery—and subsequent publication—of a shift toward postsecondary education within the aviation industry can bring positive economic benefits to the field. The aggregate results of this—and previous—Aviation Management Education Study (AMES) research will help satisfy a literature gap.

Secondary

During the investigation, researchers discovered a gap surrounding aviation managers' views on the impact credentials and experience weigh in the current industry environment. As a result of this study, aviation scholars and current employees are afforded the perspective of a select few hiring managers regarding how they view certification and experience, as well as how heavily each plays a role with respect to several career fields explored. The foregoing information will prepare better those who plan to apply for positions within the industry by ensuring they can accurately compare their current qualifications with what managers prefer or, in some cases, require.

Conceptual Framework

Newcomer et al. (2014) conducted the initial AMES study that focused on aviation manager's perspective on postsecondary education within their organization. Continuing the conceptual framework used by the original authors was necessary to adequately address the research gap identified within their research. Newcomer et al.'s previous study featured a systems engineering work breakdown structure (WBS) framework employed by the National Aeronautics and Space Administration (2010). Such a framework allows project managers to start with a high-level objective (e.g. build airplane) and break it down into smaller requirements, such as: airframe, hydraulics, powerplant, etc. This logical breakdown of projects makes the sub-projects more manageable and ensures they connect to the larger objective. Given the foregoing, we employed the WBS framework to highlight the top-level literature and subsequent studies necessary to address fully the gap concerning aviation management education. As depicted in Figure 1, this study serves as the second part of a series initiated to address the call for future research identified by Newcomer et al. Unlike the original WBS that was a "sample" representation of the possible outcomes, the modified AMES-2 WBS figure present's accurately the AMES-1 areas for recommended research (Newcomer, Marion, & Earnhardt, 2014).
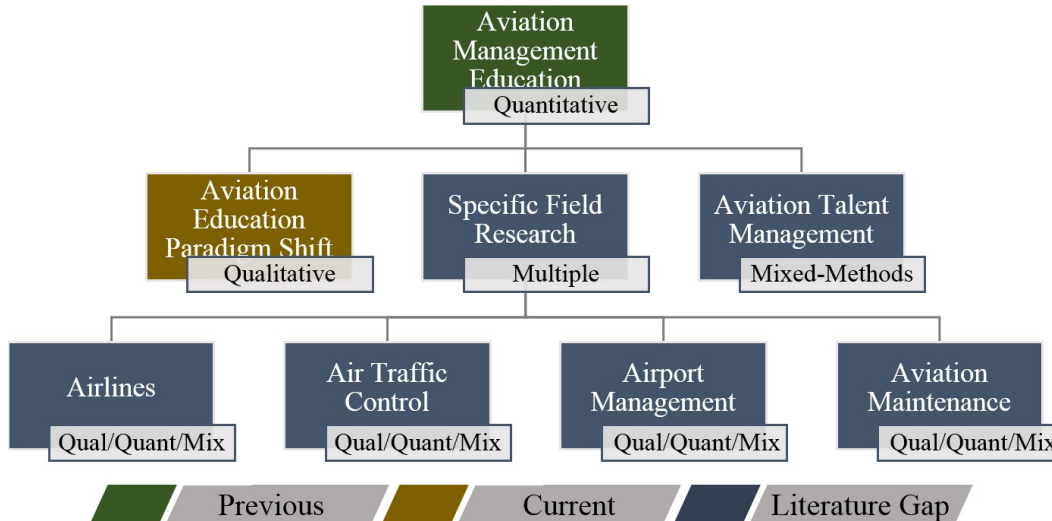

Figure 1. A representation of the complete, in-progress, and future AMES initiatives required researching fully the aviation management education gap. Adapted from "Aviation Managers' Perspective on the Importance of Education" by J. M. Newcomer, J. W. Marion Jr, and M. P. Earnhardt, 2014, *International Journal of Aviation, Aeronautics, and Aerospace*. Reprinted with permission.

Definitions

The research team used the following definitions during the investigation:

Education – Academic knowledge gained from an accredited college or university.

Experience – Knowledge or practical wisdom a person gains resulting from exposure to a given profession over time.

Certification – Credentialed skills, such as: (a) pilot's license, (b) control tower operator (CTO) credential, (b) airframe and powerplant (A&P) license, (d) air transport pilot (ATP), (e) life-cycle logistician, or (f) similar credentials and ratings.

Paradigm Shift – A change or shift away from one method of thinking to another that is often driven by change agents versus natural events.

Literature Review

The review of professional and academic literature was essential to help shape the study and understand areas where empirical research would best contribute to the exploration of the problem. Most important was the need to understand the shift in industry mindset and the role that education and certification play in the industry. Finally, a comprehensive literature review and clearly defined problem illuminated the research question to explore during the data collection phase.

Shift in Mindset

Newcomer et al. (2014) in a study of aviation managers' perspective on education found that though aviation managers did not feel their education was important for obtaining their current position, those same managers believed that an education is important for new hires. They speculated that there could be a possible shift in the industry with the importance of education, certification, and experience. Newcomer et al.'s (2014) study offered preliminary evidence that a shift in attitude toward education may have occurred in the aviation industry. Several studies have investigated the importance of education in aviation. Smith et al. (2013) found that those with a four-year college degree required less training events than an individual with no degree among pilot training. Further evidence suggested the importance of a specialized degree in aviation related fields of

study. Similarly, Cortes (2008) found that pilots with the greatest level of success in training graduated from an Aviation Accreditation Board International (AABI) Accredited flight program. The importance of education is not lost on pilots as more and more pilots are combining flight hours with academics (Wensveen, 2011). Meehan and Kunches (2012) in an article on space weather suggested that an education is essential at all levels of aviation including: (a) air traffic control, (b) pilots, (c) airfield management, etc. Similarly, a study on pilots' perceptions toward distance education showed a positive shift toward the benefits of distance education as an educational delivery method (Raisinghani, Chowdhury, Colquitt, Reyes et al., 2005). Raisinghani et al. further discussed that the attitudes of the business aviation pilot are changing rapidly while keeping high expectations of future learning opportunities. Fullingim (2011) discussed that over 70% of pilots have a four-year degree, and this is the standard that pilots desired to obtain. Furthermore, in a study in human capital, Switzer (2011) noted that the acquisition of specific human capital through formal training (such as certification) and general human capital through education programs. Switzer discussed that this applies to a variety of career fields in aviation from mechanic to a chief of staff and that education should be tailored to benefit those completing their jobs. Finally, in a study of aviation educators, Ruiz (2004) found respondents believed that communication is an important skill that needs to be taught in aviation curriculum.

There have been several changes in the recruitment strategy of the aviation industry as the aviation workforce ages and a shift from traditional recruitment sources has occurred. Within the aircraft engineering maintenance sector, several changes have occurred over the last fifteen years that have impacted the aviation workforce. One issue is the lack of aircraft engineering apprenticeships that are available as airlines seek to reduce costs (Watson, 2006). Similarly, a reduction in force for the military has reduced a traditional source of recruitment and the number of engineers available to the civilian market (Watson, 2006). Traditionally, the transportation sector relied on the military for recruiting aviation employees but this strategy will no longer work because of the reduction in military forces that occurred over the past two decades. In other words, employers need to find new sources of employees given the great need (Popkin, Morroe, Di Domenico & Howarth, 2008). Materna, Mansfield and Deck (2013) echoed this sentiment in the aerospace industry by discussing that with an aging workforce there are not enough skilled workers in the workforce pipeline.

Applebaum and Fewster (2002) commented that airlines are having difficulty finding qualified employees as a result of both the baby boomer era and shrinking supply of qualified military pilots. Similarly, Watson (2006) noted that

the typical military recruitment sources for aircraft engineers are not available and aircraft engineers need to rely on higher education and students' learning experiences. Furthermore, Applebaum and Fewster (2002) highlighted that airlines are looking beyond flying skills in pilot hiring. Pilots must work well in a crew situation. Applebaum and Fewster (2002) discussed that the need for qualified employees extends beyond pilots to frontline positions as well. The need for additional skillsets and the aging workforce has caused the need for a shift in the way workers are recruited in the aviation and aerospace industries (Materna et al., 2013; Popkin et al., 2008). Smith et al. (2013) discussed a shift in hiring practices as airlines have hired pilots with less experience than previous generations due to a diminishing military pilot pool. Most recently, military force reductions have caused aviation higher education to assume an increased role in providing qualified workers to the rapidly growing aviation industry (Ison, 2010).

Aviation Education and Certification

The history of post-secondary aviation education programs dates back to 1914 (Radigan, 2011). Over 104 colleges and universities offer aviation centered academic programs from associates to doctorate degrees and are vital to providing the industry with competent personnel (AABI, 2014; Radigan, 2011; Sherman, 2006). Fullingim (2011) discussed that aviation collegiate programs are viewed as a necessary path for students to receive both a professional aviation background and college degree. Regional airlines hold universities with aviation programs in high esteem although those in the aviation industry have degrees from a variety of backgrounds (Fullingim, 2011; Newcomer et al., 2014). In addition to a variety of aviation academic education programs, institutions can achieve aviation program accreditation through the Aviation Accreditation Board International (Sherman, 2006). As of 2014, there were 34 institutions and 76 programs accredited through AABI (AABI, 2014). Radigan (2011) outlined that AABI is the sole accrediting agency for aviation programs. As of 2011, 25% of institutions offering non-engineering aviation degrees have programs accredited by ABBI. Furthermore, the accreditation is important for students' perceptions of their degree quality and preparing them for their career (Radigan, 2011).

A professional certification is a designation that certifies a person can perform a specific job (Yadav & Nikraz, 2012). The Federal Government provides regulations on certification requirements for those that operate, maintain, manage, or service aircraft to "provide the safest, most efficient aerospace system in the world" (FAA, 2010, para. 1). This is necessary to provide the public with a safe, reliable transportation system and can ensure that those who maintain or operate aircraft are properly trained (Sadasivan & Gramopadhye, 2009; Yadab &

Nikraz, 2012). As part of the FAA's charge, they issue thousands of certifications and approvals annually (Issues with FAA certifications, 2010). For aviation maintenance personnel, the Federal Government outlined that anyone working on aircraft must meet certain competency requirements (Kraus & Gramopadhye, 2011). Title 14 of the Code of Federal Regulations outlined specific initial and reoccurring training that aircraft mechanics or aircraft maintenance technicians (AMT), participate in to receive certification. Likewise, aircraft inspections must complete training and certification as well (Sadasivan & Gramopadhye, 2009). Similarly, air traffic controllers have a robust training and certification process that involves a written examination, practical performance measurements, and on-the-job training. In addition to initial training that is lengthy and meticulously structured, there are annual refresher courses for operational air traffic controllers that seek to meet the demands of emergency and abnormal situations (Malakis & Kontogiannis, 2012). Finally, airline transport pilot (ATP) certification requires a number of flight hours, an aircraft rating, and academic training (Schogol, 2012). Though every position in aviation does not require certification, certification is an integral part of many aviation jobs.

Research Question

The central research question for the study was: Has the perception of aviation and aerospace managers changed regarding the importance of education, certification, or experience when hiring new employees or assigning new team members? If so, why?

Methodology

Understanding the potential aviation management education paradigm shift required a depth of immersion not afforded by quantitative research (Creswell, 2009). To adequately answer the research question, we employed a qualitative phenomenological study using semi-structured interviews to understand the lived experiences of aviation managers (Creswell, 2007). As recommended by Yin (2009), we used a robust analytic strategy that coupled the qualitative data of this study with the supporting quantitative data collected by Newcomer et al. (2014).

Population and Sampling

The sample consisted of aviation managers (n = 14) from the U.S. aviation industry who volunteered to be part of a qualitative inquiry during Newcomer et al.'s (2014) AMES-1 survey. At the conclusion of each interview, researchers

offered the participants an opportunity to provide additional, qualified contacts for participation in the study. Purposeful sampling was most appropriate as it afforded the benefit of information-rich qualitative data from a smaller group of subject matter experts vs. the often superficial data collected from widely disseminated surveys (Thomas & Magilvy, 2011; Vissak, 2010).

Data Collection, Treatment, Validity, and Reliability

Creswell's (2007) data collection activities formed the framework for the collection effort. Given the remote nature of the interviews, physical site selection was not necessary; however, the medium by which the interviews were conducted was of critical importance. Skype^TM was selected as the most effective option for eliminating travel cost and because of its ability to record conversations to be later transcribed and converted into valid research data. Valid research consists of instruments that measure the intended objectives, and reliable research yields consistent results with each use (Golafshani, 2003). For valid, reliable information, Creswell (2007) suggested 5 – 25 participants, or until a hermeneutic circle was reached; both of which were achieved during this study. To streamline interview logistics and maintain reliability, each researcher was assigned 1/4th of the total participants and given an interview protocol with standardized instructions. Interview protocol questions are listed in Table 1. To certify the validity (or credibility) of the findings, the research team's interpretations for each interview were provided back to the individual participants to verify the accuracy of the interpretations—a qualitative research process known as "member checking" (Thomas & Magilvy, 2011, p. 153).

Table 1
Interview Protocol Questions

Order		Question
1		Can you briefly describe your career progression?
2	a	When choosing new team members, how do you factor in education?
	b	Has this view changed over the course of your career? If so Why?
3	a	When choosing new team members, how do you factor in certification?
	b	Has this view changed over the course of your career? If so Why?
4	a	When choosing new team members, how do you factor in experience?
	b	Has this view changed over the course of your career? If so Why?

Data were analyzed using procedures introduced by Colaizzi (1978) and later refined by Moustakas (1994). Unlike the aforementioned seminal studies, we

capitalized on the technology afforded by the NVivo 10 to assist with the data analysis. The following list of tasks describes the data analysis steps for this study:

1. Researcher's reviewed the transcribed interviews for familiarization.
2. Significant sentences and phrases were identified.
3. Items were clustered into common themes using NVivo 10 node functions.
4. Aggregate data were used to develop an in-depth description of the phenomenon.

Results

The data derived from the themed and coded interview transcripts yielded a substantial amount of information surrounding the research question. The charts, tables, and associated descriptions serve as a presentation of that data. A comprehensive discussion of the results, to follow, provides insight into their meaning and connects the findings with real-world application.

Individual Analysis

The research team coded and themed the interview transcripts at both the aggregate and participant level to investigate the phenomenon fully, validate the themes, and provide the necessary detail to accurately interpret the results. At the participant level, we themed general comments into positive, negative, or neutral importance categories for education, certification, and experience. Similarly, we themed changes in the importance of each area and presented the interpreted themes back to the participants for validation. The results of the validated themes (or nodes) are represented below in *Table 2*. We extracted three key data points from the results:

- Seventy-one percent of participants agreed that their views on the importance of education for new hires has changed over the course of their career for various reasons.
- Nearly every aviation field explored required one or more certifications of the new hires. The participant in Aviation Brokerage noted that while a certification is not required, he and his coworkers all have an aeronautical certificate to relate better to the customers.
- Experience was a consistent area of importance and strongly desired by each hiring manager.

Table 2
Summary Data of Individual Interviews

n	Managers' Field(s)	Edu	Δ	Cert	Δ	Exp	Δ
1	Pilot (Charter)	=	-	+	=	+	-
2	Aircraft Maintenance	+	+	+	=	+	=
3	Aircraft Electrician/Ops Manager	+	+	+	+	+	+
4	Airport Marketing & Consulting	+	=	=	=	+	=
5	Aviation Safety Inspection	+	+	+	=	+	=
6	Air Traffic & Airport Management	+	+	+	=	+	+
7	Pilot (Airline)	=	+	+	-	+	=
8	Aircraft Brokerage	+	=	+	+	+	+
9	Aircraft Maintenance	+	-	+	=	+	+
10	Pilot (Airline)/Safety/Flight Ops	=	+	+	=	+	=
11	Engineer (NASA)/Pilot (Military)	+	=	+	+	+	+
12	Military/Airport Management/FAA	=	+	+	=	+	=
13	Air Traffic/Adjunct Faculty/Author	+	=	+	=	+	=
14	Logistics Program Management	+	+	+	+	+	=

Note: The table uses the following category coding: a. Participant (n), b. Education (Edu), c. Certification (Cert), d. Experience (Exp), e. Change/Delta (Δ), f. Green (positive change), g. Gray (no change), h. Red (negative change).

Aggregate Analysis

The research team coded the specific comments related to views for each theme to identify which views have changed, the magnitude of that change (rank), the direction of the change (trend), whether it was based on the role under consideration (role), if it was required (req'd), or for another reason (other). *Table 3* depicts the results of the analysis. The researchers extracted two key points from the results:

- Education appears to be the only theme with consistently positive trends.
- The majority of comments related to education were focused on the job role held.

Table 3
Aggregate Code Results, Ranking, and Trend Information

Theme	N	Freq	Rank	Trend	Role	Req'd	Other
Education changed	8	9	72	+	6	2	1
Certification changed	5	5	25	+/-	0	2	3
Experience changed	4	4	16	+/-	1	0	3
Certification did not change	4	4	16	--	1	0	3
Education did not change	3	3	9	--	0	0	3
Experience did not change	3	3	9	--	0	0	3

We used code ranking and a Pearson Correlation Coefficient to analyze interview excerpts by comparing node similarity. *Table 4* and *Figure 2* display the analysis results. According to the coded data, the experience, certification, and education are categorized by aviation managers in that order of importance. It is important to note that while experience ranked higher than certification, there were more participants that mentioned the importance of certification than those that mentioned the importance of experience.

Table 4
Code Ranking

Name	Sources	References	Rank
Experience weighed more heavily	8	19	152
View changed	8	15	120
Certification important	9	12	108
View did not change	6	9	54
Education important	7	8	56
Education less important	4	7	28
Certification required to do job	6	7	42
Certification importance depends on role	4	5	20
Critical thinking important	2	4	8
Education requirement depends on role	2	2	4
Certification and experience outweighs degrees	2	2	4
Certification less important	2	2	4
Experience weighed less heavily	2	2	4
Education a base requirement	2	2	4

Note: The ranking assumes that codes that appear more often and in more interviews are more significant.

Figure 2 depicts the nodes clustered based on word similarity and favors certification due to respondents' who commented versus frequency mentioned. The importance of education was mentioned the least when compared to the other nodes, and within those nodes, there was more mention of "view change" (Rank = 108) than there was of "view did not change" (Rank = 54).
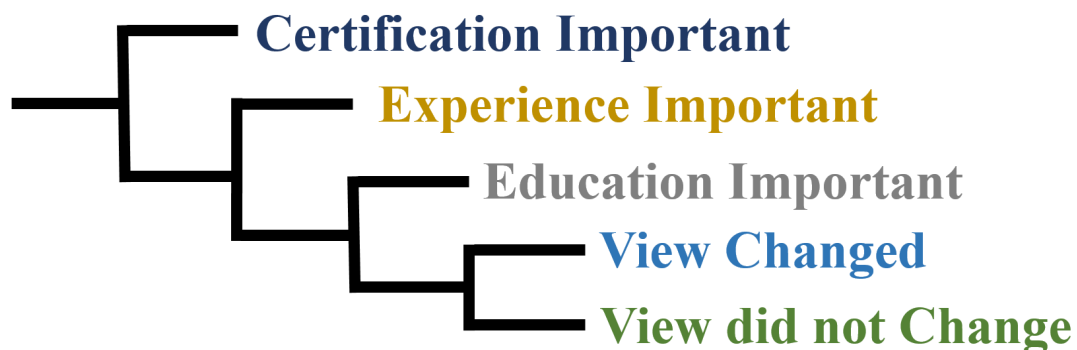

Figure 2. Node similarity using Pearson's Correlation Coefficient and Interview Excerpts.

Discussion

The purpose of this research was to examine if the perception of aviation and aerospace managers had changed regarding the importance of education, certification, or experience when hiring new employees or assigning new team members? And, if so, why? The study was precipitated by Newcomer, et al.'s (2014) premise that aviation managers had undergone a potential paradigm shift related to the importance of education for new hires in the aviation industry. This study supported the idea that aviation and aerospace managers perceived a shift in the importance of education—relative to experience and certification—when hiring and selecting new team members.

The data showed that managers perceived that education, certification, and experience were all important factors when hiring or selecting team members. The managers' perceptions were mitigated by their roles and their sector within the aviation and aerospace industries. For example, engineering managers viewed education as essential to a career in aerospace engineering and maintenance managers described certification as essential to a career in aviation maintenance. Almost every individual viewed experience as the most important factor when hiring or selecting a new team member.

Education had consistently positive trends among the responses and was viewed to be more important by participants primarily due to changes in their

roles as they advanced through their careers. Education either aided career advancement or it is now a base requirement for a particular role. Participants in similar fields sometimes had conflicting views regarding education importance (i.e. air traffic control, aircraft maintenance, and pilots). Those who valued education focused on their managerial roles while those who did not focus on the tactical level function, such as the actual pilot, the brand new line controller, and new maintainers. For each of these positions, a certification was sufficient. In either case, all of the managers had at least a 4-year degree.

Many of the participants described that the reasons for the shifts in their points-of-view were related to the natural maturation process that occurs as one grows up in an industry and learns more about the job, the industry, and what is important to perform. This increase in importance in education, relative to certification and experience, could indicate that individuals who are starting out are simply unaware of how important education is in developing critical thinking, communications, and managerial skillsets. On the other hand, everyone seems to understand that experience and certification are essential, even at the early stages of a career, so those values did not change much over time.

The results suggested managers have a hierarchy of importance as they consider the background of a new hire or team member. They are mostly concerned with experience. Then, if the job is more technical, they are likely to look for certifications that relate to the job requirements. If the job is managerial or requires communication or other soft skills, the managers will probably look to experience, and then education.

As employees move through their careers, they gain knowledge and competence through hands-on experience and employer training. Whether they independently seek certification or education, or both, may be largely dependent on whether they hope to remain in a technical track or move to a management track. This has implications for both employees and employers.

Employees who are applying for a certain type of job should focus their resumes, cover letters, social media campaigns, and interviews on their experience and then whichever is more important for a specific job, certification or education. Most job seekers are presenting all of their qualifications as equally important and do not realize that hiring managers are not viewing their credentials in this manner.

Employers should consider how they are developing their employees and consider programs that develop the types of credentials they want employees to

possess. For example, many companies offer educational benefits or will pay for industry certifications. Perhaps those benefits should be customized based on anticipated career paths and should not be left up to the employee to decide.

Theoretical and Practical Applications

Theoretical

There are several theoretical applications from the current research. The current research offered insight into job-fit. Person-job-fit is a match between a person's competencies and job demands and attributes (Earnhardt, 2014). The current research indicated that hiring managers in aviation value a combination of competencies (soft skills such as critical thinking, communication, etc.), experience, and certification. Though, the researchers did not intend to study job-fit, the research offers evidence for the role of person-job-fit, hiring the right competencies and matching the individual with the job characteristic. Second, the current research offers insight into the growing research of knowledge, skills, and abilities (KSA). Each of the three areas investigated for the current study mapped to the theoretical concept of KSAs (see Figure 3).

The study indicated that aviation managers are looking for new hires and team members with a combination of technical skills and soft skills. Boyles (2012) indicated that social skills are of primary importance in the development of KSAs, and the current research would indicate the same. Though not specifically asked, participants in the current study signified that soft skills are of particular importance and that education is the key to developing these skills. In a study by Shawn, Jim and Jitendra (2014) older workers are kept in the workforce longer, even though they are generally more expensive than younger workers, because they have the requisite KSAs that industry needs. The current research showed that experience is very important to the job and is paramount to the aviation industry hiring process. Hiring experienced workers translates into less training cost and could have implications on turnover as well (Shawn et al., 2014). The current research would offer support for those assertions as experience then education was looked to for certain positions.
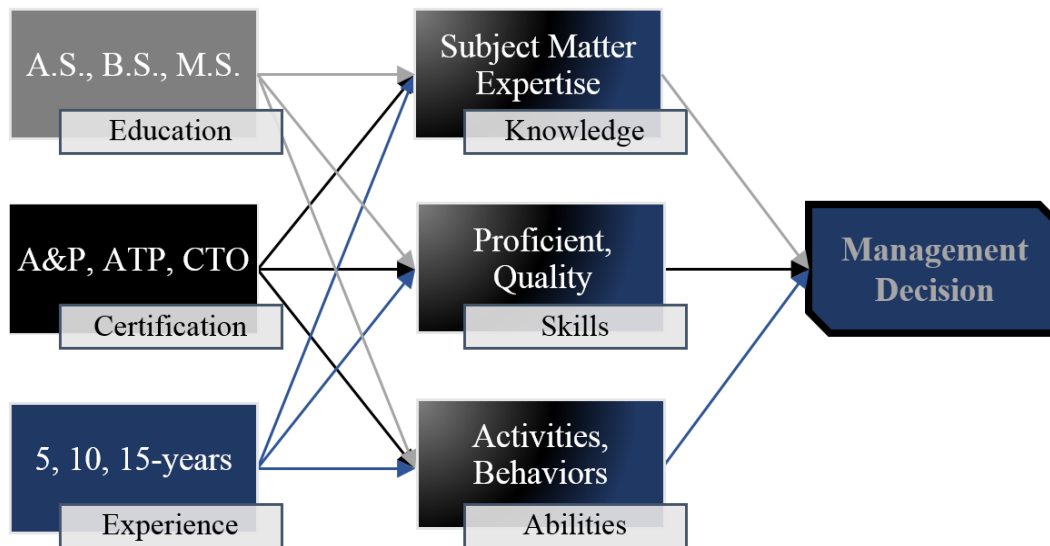
Figure 3. Theoretical framework linking education, certification, and experience to KSAs, and the management decision to hire or select to a team.

Practical

There are several practical applications of the research. First, career counselors can use the research to advise those interested in a career in the aviation industry. The research suggested that experience, certification, and education are important for hiring and selecting team members. One important note though is that this is job dependent. A career counselor could discuss that those interested in a career in aviation should understand the specific requirements for the role or sector they are interested in. Furthermore, students that are obtaining a degree need to understand that their degree will not be enough, and they should look for every opportunity possible to gain experience, through internships or other type activities.

In addition to career counseling, human resource managers could use the results from the current study to explain the importance of education in career progression. Though the results of the current study indicated a moderate shift in the perception of education, it is clear that for managerial positions, a degree is important. Individuals that are looking to advance should pursue post-secondary education. Degrees specific to aviation and business are preferred among the aviation managers in both the current study and previous studies (Newcomer et al., 2014). For universities and program administrators, managers interviewed focused on the importance of soft skills related to education. The results of this study could be used to develop a degree program, or modify an existing program,

to focus on critical thinking, communication, problem-solving skills, and other desired soft skills.

Assumptions, Limitations, and Delimitations

Assumptions

A necessary assumption was that the participants provided honest feedback during the interviews. We based this assumption on the protection afforded by the confidential data collection techniques and the participants' understanding of the potential positive contributions of the study to their field. We assumed the results of the study could be replicated by future researchers. While it is possible that an in-depth review will uncover different explanations of the phenomenon, we assume the perceived importance of education to the industry and reasons for the relative education importance compared to experience and certification will remain the same.

Limitations

The research team addressed internal and external physical limitations in a similar manner. The research team was geographically separated from participants as well as other team members. To overcome this limitation, we used Skype^{TM} for regular team meetings and research interviews. The virtual alternative had no apparent impact on the study. We were also limited by the number of available participants to interview. During the AMES-1 research, participants provided contact information to participate in the follow-up qualitative study. We made two attempts to contact each of the participants that volunteered and received a 42 percent participation rate (n = 14) from the total population (N = 33).

Delimitations

The only self-imposed limitation—or delimitation—for this research was the number of interview questions to include on the protocol. Although more data could have been collected, we concluded that the selected questions would drive sufficient conversation to address completely the research question and not overtax the time of the participants. This delimitation had no impact on the research as a hermeneutic circle was achieved during the research.

Recommendations for Future Study

There are several recommendations for future studies. First, the data indicated that there is a moderate shift occurring in the aviation industry. Future research should continue to investigate the shift in aviation regarding attitudes toward education. Second, it is clear that experience and certification play a role in certain career fields within the aviation industry. Future studies could specifically investigate different career fields within aviation/aerospace and determine what certifications, education, and experience matter to hiring managers in given sectors. Likewise, future studies could investigate what soft skills are important to different career fields and why. These studies could help direct those interested in a career in aviation as they determine what path to take. As discussed in Newcomer et al.'s (2014) study on aviation education, there are still several areas for future research to address the gap in aviation education (see Figure 1). As Eaton (2001) explained, aviation has typically been considered a closed group to researchers. Considering the foregoing, the possible research streams related to education, hiring, experience, and certification are endless and could provide insight into this major global industry.

Conclusion

The shift in importance of education was true for a slight majority of participants, dependent upon the specific roles and sectors of the interviewee. A larger sample of individuals across multiple aviation and aerospace roles and sectors might validate whether the phenomenon is specific to the role and sector. This understanding is important because it is possible that these results apply to some aviation and aerospace professionals, but do not apply to others. These results might also generalize across industries, especially industries where technical certification is important. For instance, it might be the case that managers within high tech, automotive, or health care would have similar preferences related to hiring and forming teams within their respective industries. It is also possible that managers from other industries would have similar shifts in attitude during the course of their careers. In either case, aviation researchers should continue to monitor the developing phenomenon.

Author Biographies

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