

ATEC JOURNAL

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2019

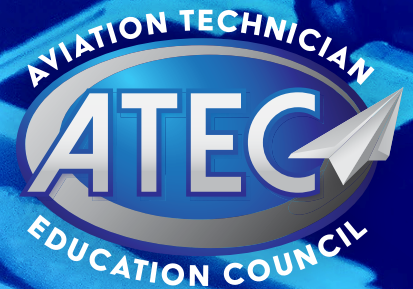
VOL 41 • ISS 2
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3 COMMITTEE UPDATES

5 PROGRAM SPOTLIGHT

9 EVALUATING THE EFFECTIVENESS OF
LIBERTY UNIVERSITY'S HIGH SCHOOL
AVIATION MAINTENANCE CAMP

19 WHAT AND WHO NEED TO BE
DOCUMENTED IN THE LOGBOOKS



ATEC JOURNAL SUBMISSIONS

The *ATEC Journal* (ISSN 1068-5901) is a peer-reviewed, biannual electronic publication. The publication provides an opportunity for educators, administrators, students and industry personnel to share teaching techniques and research. Authors are encouraged to submit their articles for publication consideration, whether scholarly, research, application, or opinion, by using the submission form below. Papers supporting the council's regulatory and legislative agenda may be considered for presentation via online webinar and at the annual conference. Suggested topics include:

- Technical and soft-skills curriculum integration
- A history of legislative actions affecting aviation maintenance workforce development
- A study on implementing employer-education partnerships
- Funding implications stemming from Bureau of Labor Statistics occupational outlooks
- Highlighted innovations in the aviation maintenance industry
- A look at successful online teaching methods and subject matter in other technical fields
- Surveying currently used computer-based teaching across aviation maintenance training schools

SUBMISSION DEADLINES

Fall Issue Closing Date: October 1

Spring Issue Closing Date: May 1

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**SUBMIT AN ARTICLE
FOR CONSIDERATION**

FROM THE EDITOR.



I hope everyone's academic year is off to a good start. As we all get busy with the school year, I'd like to thank you for your continued interest in ATEC and the Journal.

In this issue you will read about exciting opportunities for high school students in Virginia as Steven Brinly discusses his mixed method study on the implementation of an aviation maintenance camp at Liberty University. He provides quantitative evidence with in depth verbal accounts from students that speak to the effectiveness of such programs. In light of the maintenance technician shortage the industry is facing, programs like these are one thing that AMT programs can do to help. I hope that you will find inspiration from his article.

Matthew Harrison also provides a broad coverage of the requirements for maintenance logbook entries and how those requirements can be interpreted erroneously. With examples from the real world and tips on how to incorporate these rules into classroom teaching, Matt takes this detailed rule and breaks it down into manageable parts.

Our spotlight for this issue focuses on Westfield Technical Academy in Westfield, Massachusetts. WTA is one of the only AMT high schools in the nation where students graduate with both their high school diploma and the ability to take the FAA airframe and powerplant certification tests. Department Chair Galen Wilson, provides a detailed account about how it all works.

There are new and exciting changes happening with ATEC so please be sure to read about what each of the ATEC committees has accomplished for our members. Be sure to reach out to us with any feedback you may have to help maintain this forward momentum. And of course, please feel free to contact me with any questions or concerns regarding the Journal.

As always, thank you to the Editorial Board for their dedication to the Journal. And thank you to the readers for your unwavering support.

Best Wishes,

Karen Jo Johnson

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REGULATORY COMMITTEE

ATEC continues its push for pragmatic and common-sense part 147 rulemaking. In September, the council facilitated a roundtable with FAA leadership. Flight Standards Service Deputy Executive Director Larry Fields and Deputy Director Office of Safety Standards Van Kerns were joined by 12 of their colleagues to discuss a laundry list of regulatory issues impacting certificated part 147 schools.

Attendees discussed the impact the recent supplemental notice of proposed rulemaking would have on schools, and the role of accrediting bodies vs. the FAA in overseeing educational quality elements in their technical programs. ATEC strongly suggested—as it did in its comments to the SNPRM—that the FAA defer to Department of Education accreditation requirements on all matters concerning educational oversight.

This fall, the council also sent the FAA a formal written proposal to aid better facilitation of maintenance programs into high schools through utilization of “additional fixed locations” for part 147 certificate holders. Given the growing demand for mechanics, and the expanding opportunities for high school partnership programs, the issue will remain a top priority for the regulatory committee in 2020.

LEGISLATIVE COMMITTEE

Thank you to everyone who attended the Fly-in. We had a very productive and informative series of meetings with the FAA. Many schools participated in Hill meetings with their industry partners to further ATEC legislative initiatives.

During the Fly-in, members laid the groundwork for introduction of a part 147 direct rule, championed by Senator Inhofe of Oklahoma. Attendees obtained widespread support for the initiative, and also secured strong backing for a companion bill in the House as soon as the Senate bill is introduced.

Please continue to reach out to your senators and congressmen requesting support for this legislation. More information on the part 147 initiative and other ATEC legislative priorities, is available at www.atec-amt.org/legislative.



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MEMBERSHIP COMMITTEE

In September, the ATEC board elected to increase membership dues to fund several new initiatives including Choose Aerospace (see Communications Committee report, below), expanded support staff, and new member resources that will be unveiled in the coming year. The membership committee has been blown away by the community’s response: unwavering support for the council’s initiatives even when asked for a greater financial commitment.

Encouraged by the positive response, the committee is embarking on a campaign to increase its part 147 school representation from 72% to 85% by 2021. For those schools that are not members, ATEC and its volunteer leaders will be reaching out over the course of the next several months in an effort to persuade your institution to join our ranks. There is power in numbers, and the council needs all of us to advance an agenda focused on aviation maintenance workforce development.

Whether you are a school or a company, take a moment to [confirm your membership status](#), and [join us](#) if you have not already.

MEETING PLANNING COMMITTEE

Howdy, ya’ll. (I’m practicing for when I see you in Texas next March.) The ATEC board can’t wait to see you in downtown Ft. Worth March 29-April 1 for the ATEC Annual Conference. All activities will be at Tarrant Community College’s beautiful downtown campus overlooking the Trinity River, including our general sessions, breakout meetings, interactions with our vendor partners, and our annual graduate job fair. We’ll have events around the downtown area in walking distance, and our sponsors have some incredible surprises for us while we’re there.

Speaking of sponsors, it’s not too late to jump in and sponsor the beer crawl, a coffee break, or another opportunity. Please consider a sponsorship, as this year’s conference is likely to feature our largest attendance yet at an ATEC event. Lockheed Martin and American Airlines are premier sponsors, and we appreciate the support that many others are contributing. Why not consider a sponsorship now?

Registration for the conference will open this month, so pull your boots on and mosey over to the registration site and get signed up soon!

COMMUNICATIONS COMMITTEE

The communications committee has been working hard on researching a new member portal for ATEC. The new website will have increased capabilities for both ATEC staff and board members along with many new options for ATEC members to use. Look for its rollout in the summer of 2020.

The Choose Aerospace campaign is also gaining momentum as the committee continues its work to help with the impending maintenance technician shortage. Thanks to the broad support of a dues increase from our members, ATEC will soon expand its reach through formal creation of a charitable arm that will facilitate the Choose Aerospace awareness campaign, a scholarship program, and much more.

Lastly, we are stepping up our presence on social media so please keep your eye out for those posts to like/follow and share on Facebook, Twitter, and LinkedIn.

PROGRAM SPOTLIGHT

Westfield Technical Academy in Westfield, Massachusetts is one of only a few FAA Part 147 high school AMT programs in the country and the only one in New England. WTA started its certification process in 2015, were awarded its certificate in August 2016, and graduated their first class in 2018. To help develop and start this program, a large grant from Gulfstream along with a state workforce grant and other educational grants were procured. The end result is a 3.5-year AMT program that houses 12 airplanes, 30 mockup trainers, its own hangar, and comes at no cost to students who will graduate high-school with a diploma and the education requirements to test for their FAA Airframe and Powerplant certificate. Galen Wilson is the program head at WTA and answered questions from the *ATEC Journal* Editor and Editorial Board below.

How prepared are your students for the “new” (proposed) FAA 147?

“We (WTA) are ready for change. We are working with the Department of Elementary and Secondary Education to ensure that our State Aviation Framework Standards are not based on or derived from hours (like the current Part 147 mandates: hours in classroom and shop to fulfill a learning objective). Instead, they are based on competencies and project-based learning. From these standards and the proposed 14 CFR 147 change, our aviation schools will build their curriculum. Of course, with current FAA rules, all curriculums will incorporate FAA requirements, including hours. But, again, we are ready for the change.”

As a high school program, what STEM forces are working in your favor and what are the issues?

“Our academic courses are aligned with and relate to the technical courses that we provide. In addition to our requirement to teach math, science, and physics as part of the AMT (part 147) course our academic teachers integrate to technical learning. Our academic teachers teach ‘real life’ academics.”

What are some of the current challenges with a changing student population, learning techniques, and shifting demographics?

“Population: Over the past 4.5 years, our enrollment applications have been on the upswing. The current tendency shows that more students are interested in a technical career [today] than they were 10 to 15 years ago. This significant influx of applications is testimony to a shift in technically minded students pursuing a technical career. Again, our aviation program is 4.5 years old. Each year the number of students requesting entrance into the program has increased.”

“Learning Techniques: Our educators are mandated by state law to participate in meaningful Professional Development (PD). Our district supports the professional development initiative of all educators through elective days of training. These days are designed to meet the personalized needs of all groups (grades). Educators are provided a list of courses and are encouraged to seek the best course to enhance their own development, hence better serving student needs. Courses such as Special Education, English Learner, and specific CTE are provided among a litany of others.”

“Shifting Demographics: With the retirement of baby boomers and an aging workforce in the technical career field is real. So, WTA added the AMT program to its courses of study after identifying that the immensely flourishing aviation industry was experiencing an ever-increasing technician shortage. From conception in the fall of 2013 to FAA certification a short time later in August 2016, WTA’s FAA-certified AMT program came into being because of the combined efforts of local officials, industry members, and numerous volunteers. Western Massachusetts is home to several aviation companies and military installations, and WTA’s AMT program fills a very real need in the area.”

What does your highly selective student selection process entail?

“All ninth-grade students have the opportunity to explore the 12 career technical programs for a one-day overview. These students will begin their individual career plans and goal setting standards as they assess each shop. At the conclusion of the one-day experience, the students examine four of their top six programs of interest. Ongoing career development throughout the one-week rotation is critical to every student because they have



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to narrow their career technical program to two choices before the end of the second term. Final shop selection is based on shop performance, grades, attendance, behavior, and aptitude. When selected, students are responsible for working closely with their parents, guidance counselors, administration, and teachers to ensure that their choices align with their career plan and goals."

Why did you select the format to alternate weekly between AMT and academic classes? It seems to interrupt the learning process by changing subjects so frequently, then having to get back up to speed on the subject they left, etc.

"This model has proven to work best for us. Learning never stops. The week on, week off schedule allows the students the necessary time to stay on task versus starting and stopping; shifting from history class to rig checking a landing gear would be difficult to execute. I do not believe that we would be able to provide the necessary training if our focus was any different. Our students spend 6 hours a day, 5 days a week working with or on aircraft in the FAA-approved program. If we were set up to operate on a half-day schedule, I believe an 'aviation program' (introduction to aviation) would be possible, but an FAA program would not. Again, this is my opinion."

Do you have dual-credit or concurrent enrollment programs to allow students to earn college credit while they attend the Part 147 HS program?

"Yes. We have a dual-enrollment program that many of our students take advantage of; however, the accreditation is focused around academic, not technical. In other words, students may earn credits for advanced academic courses (foreign language, calculus, economics, etc.) not for the AMT part 147 course."

Do the faculty members have to also be high school teaching credential certified?

"Yes, licensure and state level testing are a requirement. Of course, FAA certification is required." (WTA currently has 3 faculty members.)

Does your state/local department of education see this as viable, long-term program? What is the long-term timeline?

"Yes, aviation – AMT is here for the long haul. Massachusetts Chapter 47 (Governs CTE programs) AMT STRANDS have been developed and are awaiting final state approval (within the next month or so). Additionally, the Massachusetts Teachers Education License (MTEL) exams have been built and are ready for execution upon final approval."

What do your career support persons do to keep the students focused on the end goal?

"WTA's Guidance Office is proactive. Student guidance counselors help students achieve their academic/technical, workplace readiness, and personal/social potential. They are fabulous at providing career and academic counseling to all students. From the graduating aviation class of 2019, all students have gone on to an aviation post-secondary college, to the military, or working in the aviation industry. This 100 percent placement is testimony to the WTA Guidance Office's commitment to our students."

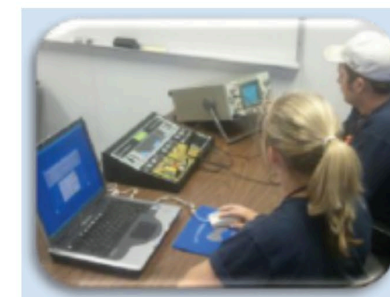
Westfield
TECHNICAL ACADEMY

On behalf of the ATEC Journal Editorial Board I would like to thank Galen Wilson and Westfield Technical Academy for their participation in this spotlight interview. We hope that the information provided in this piece highlights some innovative ideas for future AMT programs.



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EVALUATING THE EFFECTIVENESS OF LIBERTY UNIVERSITY'S HIGH SCHOOL AVIATION MAINTENANCE CAMP

BY **STEVEN BRINLEY**

ASSISTANT PROFESSOR/CHAIR OF THE AEROSPACE TECHNOLOGY DEPARTMENT
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ABOUT THE AUTHOR

Steven Brinly is an assistant professor in the School of Aeronautics at Liberty University and the Chair of the Aerospace Technology Department. He has a B.S. in Aviation and a M.A. in Intercultural Studies both from Liberty University. Steven also has a Masters of Commercial Aviation from Delta State University. He is currently pursuing a Ph.D. in Aviation from Saint Louis University. Steven began his career as a maintenance technician at a local FBO and has since worked as a flight instructor at Liberty University, in aviation business development in North Africa, and as a Part 147 maintenance instructor.

ABSTRACT

The demand for new aviation maintenance technicians outpaces the number of qualified workers entering the aviation maintenance career field. For the aviation industry to sustain and safely grow as projected, it is imperative to increase the number of individuals entering the aviation maintenance workforce. One of the best ways to increase interest in a career is through education. The aviation maintenance industry and associated stakeholders must take an active role to market and educate the public about the rewarding career opportunities in aviation maintenance. Liberty University School of Aeronautics has developed a four step community engagement plan to educate those in central Virginia. One step in this engagement plan is a four-day high school aviation maintenance camp that introduces local students to the skills required and job opportunities available for a career in aviation maintenance. In this study I used both qualitative and quantitative data to evaluate the effect participation in the aviation maintenance camp had on students' interest in aviation maintenance as a career, understanding of the aviation maintenance career, and interest in attending Liberty University's aviation maintenance training program.

INTRODUCTION

Boeing's (2019) annual *Pilot and Technician Outlook* forecasts a worldwide demand for 769,000 new maintenance technicians over the next 20 years. This increased demand for qualified employees has caused compensation for maintenance technicians to increase rapidly as employers compete for the limited number of qualified skilled aviation maintenance technicians. The Bureau of Labor Statistics lists aircraft mechanics and service technicians as one of the highest paying occupations that do not require a postsecondary degree for entry (Torpey, 2019). Even with the increasing job availability and compensation Aviation Technician Education Council (ATEC) states:

Mechanics continue to retire faster than they are being replaced. ATEC's model projects that the mechanic population will decrease 5% in the next 15 years. New entrants make up 2% of the population annually, while 30% of the workforce is at or near retirement age (Aviation Technician Education Council [ATEC], 2018, p. 1)



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This is a major problem for the aviation industry, because without a skilled workforce of maintenance personnel the aviation industry cannot operate at its maximum capacity. What is preventing today's youth from choosing an exciting and rewarding career in aviation maintenance? According to ATEC (2018) two of the biggest barriers for recruiting into the aviation maintenance industry are the lack of awareness of the industry and negative perceptions about aviation maintenance careers.

The best tool to combat lack of awareness and negative perceptions is education. A national campaign to increase knowledge of the aviation maintenance industry is beneficial, but it does not replace the responsibility of each member of industry to educate the community they have access to about the career opportunities in aviation maintenance. Liberty University School of Aeronautics has developed a multi-phase engagement plan to educate youth in central Virginia about aviation maintenance career opportunities in hopes to increase their interests in this exciting career.

Liberty University's aviation maintenance Community Engagement Plan (Figure 1) begins by partnering with local middle schools and high schools to educate students about the career opportunities in aviation maintenance. Representatives from Liberty University attend career fairs at local schools. We also host numerous school field trips to tour Liberty University's aviation maintenance training facility. During these field trips students are exposed to career opportunities and catch a glimpse of Part 147 maintenance training.

The next stage in Liberty's engagement plan is a high school aviation maintenance camp targeting rising 9th-11th graders. This free, four-day camp, is offered every summer and provides students with a combination of hands-on training and tours of aviation maintenance facilities in our region to educate them about various career opportunities in aviation maintenance. More detailed information on the camp is discussed in the method section.

Finally, Liberty University is working to launch a dual enrollment program that will allow high school seniors from local school districts to complete the Part 147 General Curriculum at Liberty University's aviation maintenance training facility.

These seniors will be able to enroll in Liberty University after graduation and complete their training to become certified as an Airframe & Powerplant mechanic less than a year after graduating high school.

In this study I focused on the second stage of Liberty's community engagement plan: high school aviation maintenance camp. The purpose of this study was to understand how high school students describe their experience of participating in Liberty University's high school aviation maintenance camp and to evaluate the effect participation in the aviation maintenance camp has on their interest in aviation maintenance as a career, their understanding of the aviation maintenance career, and their interest in attending Liberty University's aviation maintenance training program. The study was conducted with the approval of Liberty University's Institutional Review Board (IRB).

METHOD

Camp Structure

Liberty University conducted its first aviation maintenance camp in July 2019. During this four-day camp, students participated in hands-on projects and tours of local aviation maintenance facilities. The hands-on activities included fabricating a miniature airfoil from fiberglass and insulating foam, fabricating a sheet metal lap joint, fabricating a sheet metal cell phone stand, assembling a model turbine engine, running a PT-6A engine, powder coating, and learning how to use a multi-meter for electrical troubleshooting. The students also participated in three tours to introduce them to various sectors of the aviation maintenance industry.

The first tour was of Freedom Aviation, a local fixed-base operator in Lynchburg, Virginia. At Freedom Aviation the students learned about the career opportunities in general aviation maintenance and avionics while seeing first-hand how a Part 145 repair station operates.

The second tour was of Piedmont Airlines' maintenance facility in Roanoke, Virginia. During this tour, students were exposed to career opportunities in the regional and major airlines including the benefits that airline employees receive.

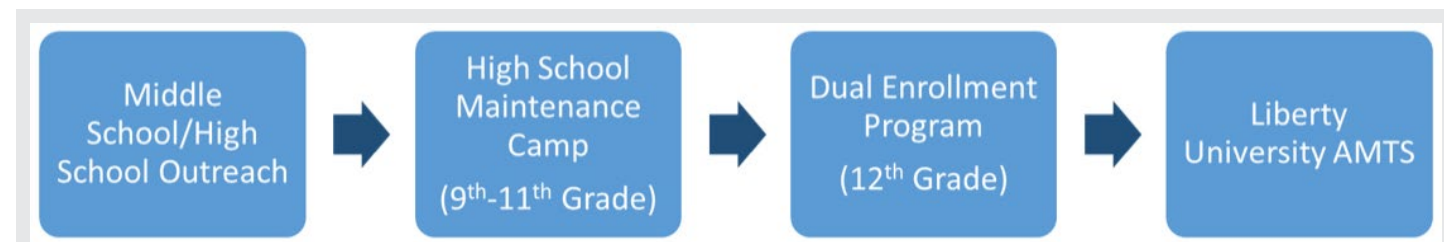


Figure 1: Community Engagement Plan

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The final tour was to HAECO Americas' facility in Greensboro, NC. While at HAECO, the students could walk next to Boeing and Airbus aircraft undergoing heavy maintenance checks and gain a perspective of the size of these commercial aircraft. The HAECO tour exposed students to career opportunities in the Maintenance, Repair, and Overhaul sector of the aviation maintenance industry.

Participants

Liberty University hosted 13 total participants in the aviation maintenance camp, but only 11 participants consented to participate in the study. Camp participation was limited to 13 by the size of vehicle used to transport participants and to ensure sufficient oversight during hands-on projects. Campers were not required to participate in this study and participation did not affect the students' involvement in camp activities. We recruited students for the aviation maintenance camp from central Virginia area high schools by school field trips to Liberty University's aviation maintenance training facility and by high school guidance counselor or referral. The 11 participants of the study were between the ages of 15 and 17 including 2 females and 9 males. Four were from a public school, four were from private schools, and three were homeschooled.

Data Collection and Analysis

I used a convergent mixed methods approach for this study. Convergent mixed methods is a form of mixed methods design in which the researcher merges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem (Creswell & Creswell, 2018). I chose this method due to the small number of participants in the study, which makes it difficult to draw generalizable conclusions from quantitative data alone. The addition of the qualitative data provides richness to the findings and validates the quantitative results.

I collected qualitative data in the form of individual video recorded interviews with the investigator about their experience on the last day of the camp. During the interview, I asked each participant the following questions:

1. How do you describe your experience as a participant in Liberty University's aviation maintenance camp?
2. What was your favorite memory from the camp?
3. How has your participation in Liberty University's aviation maintenance camp influenced your opinion about your future career?

RESULTS

Interview Analysis

Participants described their experience at the aviation maintenance camp as fun, educational and that it provided insight into new career opportunities. Analysis of the interview transcripts revealed all 10 of the interviews included the theme of fun in participant responses when they were asked to describe their experience at the camp. One participant remarked "it is really interesting to see how much work is put into this [aviation maintenance], but how fun it can be at the same time." Although the primary purpose of the camp was not to have fun, creating a fun learning experience is critical to ensuring the participants have a positive experience and leave with a positive perception of a career in aviation maintenance. Seven out of the 10 participants described the camp as educational. One participant stated:

All the projects we have done like riveting, and the stuff we are doing right now in the circuits with the multi-meter, we're learning more about aviation. It is almost like the tip of the iceberg of the industry. And it's helping a little more with [my] understanding.

Another participant stated: "It was pretty good...I came here more to just see what the career was like [be]cause I didn't know anything about it."

The final theme was not as prevalent among participants as the former themes, but half of the participants interviewed commented that the camp provided them with insights into new career opportunities they had not considered before the camp. One participant said: "I really love the new opportunities. I am getting to see professionals work and then try it out for myself." Another participant stated "I believe it broadened my view a little bit on the career field side I could be in."

Participant responses were divided when asked to state their favorite memory from aviation maintenance camp. Seven of the 10 participants described a hands-on project as their favorite memory, five chose sheet metal and two chose powder coating. The three participants who said their favorite memory from the camp was the tours unanimously agreed that the tour of HAECO had the most effect. One participant said "it was wonderful to see all those planes, see all the models. I am not a huge plane guy, I will be honest...but seeing all that, did get me more interested in every way."

The final question participants were asked was "how has your participation in Liberty University's aviation maintenance camp influenced your opinion about your future career?" Three participants indicated participation in the camp confirmed that aviation maintenance is the career path that they chose to pursue. One participant stated that

the aviation maintenance camp caused them to change their career interest to aviation maintenance. Six participants explained how the aviation maintenance camp allowed them to gain a deeper understanding of a potential career path. One said:

I mean, it's made me more excited to get into aviation and maintenance. I would say before I wasn't really excited about maintenance. When I first thought of working on an engine or something that's all I thought maintenance was, but actually getting into it and going on tours, and seeing people do it and hearing the different things that they work on, that got me excited.

One participant did not know much about the aviation maintenance industry before the camp but realized that aviation maintenance was not a good fit for them. They stated: "[Aviation maintenance camp] really just showed me what [aviation maintenance] was. And I guess, I don't really think it is the best thing for me personally." Although this student is not interested in a career in aviation maintenance, the camp provided them with the information to make an informed career decision away from aviation maintenance.

Survey Analysis

The results of the Wilcoxon Signed Ranks Test for each survey question are shown in Table 1. The Wilcoxon Signed Rank Test revealed a statistically significant ($p < .05$) increase in interest in a career in aviation maintenance (Questions 1 and 5) and in an understanding of the aviation maintenance career (Questions 2-4). There was not a statistically significant effect on the participant interest in Liberty University (Questions 6-8). Participation in the aviation maintenance camp had the largest effect on the participants' understanding of the aviation maintenance career (Questions 2-4) with a large effect size ($r > .5$) on all these questions. There was a medium effect size ($r = .3-.49$) on the participants' interest in a career in aviation maintenance (Questions 1 and 5).

DISCUSSION

The qualitative results provided by the interviews and the quantitative results from the Aviation Maintenance Interest Surveys confirm that participation in the aviation maintenance camp positively influenced participants' interest in aviation maintenance as a career and their understanding of the aviation maintenance career field. There is not a statistically significant difference in the participants' interest in attending Liberty University's aviation maintenance training program as a result of this camp.

Two possible explanations exist for the lack of statistical significance in participants' interest in attending Liberty University's aviation maintenance training program; small effect size (r) and small sample size (n). In the pre-camp

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Table 1: Aviation Maintenance Interest Survey^a

	1. I have considered a career in the field of aviation maintenance.	2. I know what career opportunities are available within the field of aviation maintenance.	3. I know what benefits are available to those who choose a career in the field of aviation maintenance.	4. I understand how to become an aviation maintenance technician.	5. I currently plan to attend an aviation maintenance technician school.	6. I currently plan to attend Liberty University.	7. I currently plan to attend Liberty University's School of Aeronautics.	8. I currently plan to attend Liberty University's Aviation Maintenance Technician Program.
Z	-2.000 ^b	-2.810 ^b	-2.549 ^b	-2.719 ^b	-2.236 ^b	-1.732 ^b	-1.732 ^b	-.849 ^b
Asymp. Sig. (2-tailed)	0.046	0.005	0.011	0.007	0.025	0.083	0.083	0.396
Statistically Significant	Yes	Yes	Yes	Yes	Yes	No	No	No
r	.43	0.60	0.54	0.58	0.48	0.37	0.37	0.18
Effect Size	Medium	Large	Large	Large	Medium	Medium	Medium	Small

a. Wilcoxon Signed Ranks Test b. Based on negative ranks.

survey only two people did not answer the question “I currently plan to attend Liberty University” with either “Strongly Agree” or “Agree.” On the post-camp survey, only one participant did not answer “Strongly Agree” or “Agree” to the same question. Because of the initial high level of interest in Liberty University there was little room for an increase in the results of this question as a result of participating in the camp. These responses could be high because the participants were from the local community, and many of them were rising seniors who are already planning to attend Liberty University. A number of the participants had also participated in field trips to Liberty University’s aviation maintenance training facility, so the camp was not their first exposure to Liberty University’s aviation maintenance training program.

The second explanation for the lack of statistical significance on the questions measuring participants’ interest in Liberty University’s aviation maintenance training program is the small sample size (n) used for this study. Camp participation was limited to 13, so I was aware the small sample size may not provide statistically significant results, especially if there was a small effect size (r). A power analysis for a Wilcoxon signed-rank test was conducted in G*Power to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, a small effect size of 0.2, and two tails (Faul, Erdfelder, Buchner, & Lang, 2013). Based on these assumptions, the desired sample size is 208. Since there was a small to medium effect size in participants’ response to the questions that measured interest in attending Liberty University’s aviation maintenance training program additional quantitative data is needed to determine the effect of the aviation maintenance camp on participants’ interest in attending Liberty University’s aviation maintenance training program.

Even with the small sample size, the results of the Aviation Maintenance Interest Survey and the interview data clearly demonstrate the participants enjoyed the camp and participation in the camp had a positive influence on their interest in aviation maintenance as a potential career and their understanding of the aviation maintenance career field.

CONCLUSION

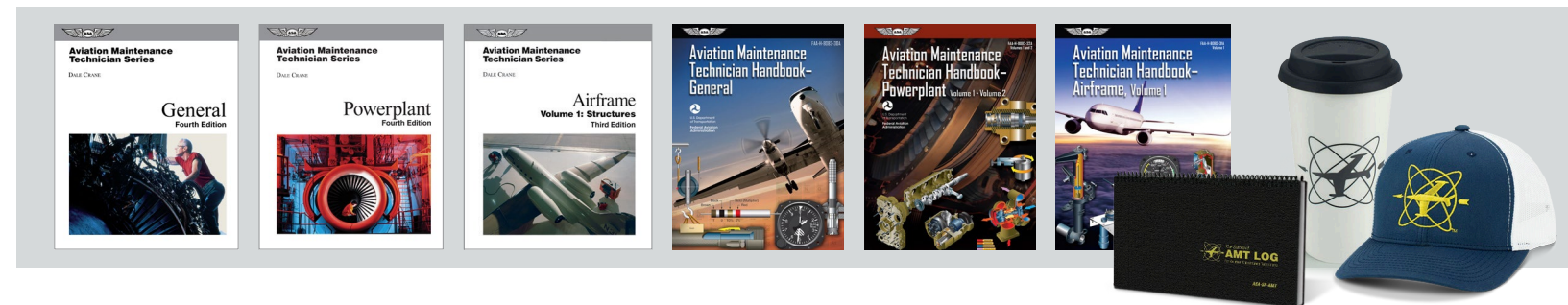
The shortage of qualified laborers in aviation maintenance is not going to resolve itself. Organizations such as ATEC and its Choose Aerospace campaign continue to increase awareness of the industry needs at a national level, but all members of the aviation maintenance industry must educate their communities about the exciting careers available in the field of aviation maintenance (Choose Aerospace, n.d.). I find, in this study, that an effective way to educate local high school students about a career in aviation maintenance is through an aviation maintenance camp. Such a camp should be fun, but also educational, and expose students to the skills required and the jobs that are available in the region. Although the results of this study demonstrate that there is a positive influence on participants’ interest in aviation maintenance as a career and their understanding of the aviation maintenance career field, more work is still needed to understand how to best educate and increase interest in careers in aviation maintenance. Liberty University plans to increase its efforts to recruit both locally and nationally for students wishing to pursue a career in aviation maintenance. Further research needs to be conducted to evaluate how many of the participants of an aviation maintenance camp pursue a career as an aviation maintenance technician.



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APPENDIX A: AVIATION MAINTENANCE INTEREST SURVEY

For each of the questions below circle the response that best characterizes how you feel about the statement.

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
1. I have considered a career in the field of aviation maintenance.	5	4	3	2	1
2. I know what career opportunities are available within the field of aviation maintenance.	5	4	3	2	1
3. I know what benefits are available within the field of aviation maintenance.	5	4	3	2	1
4. I understand how to become an aviation maintenance technician.	5	4	3	2	1
5. I currently plan to attend an aviation maintenance technician school.	5	4	3	2	1
6. I currently plan to attend Liberty University.	5	4	3	2	1
7. I currently plan to attend Liberty University's School of Aeronautics	5	4	3	2	1
8. I currently plan to attend Liberty University's Aviation Maintenance Technician Program	5	4	3	2	1

First Day Survey Responses

Participant #	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1	4	3	2	3	3	4	3	3
2	4	3	3	2	3	5	2	3
3	5	5	5	5	5	5	5	5
4	5	4	3	3	4	3	4	4
5	4	3	5	4	4	5	5	5
6	5	4	4	4	5	5	5	5
7	5	4	5	2	3	3	2	4
8	4	2	2	1	3	5	5	3
9	2	2	2	2	2	5	3	3
10	5	5	4	4	4	4	5	5
11	3	3	2	2	2	4	2	2

Last Day Survey Responses

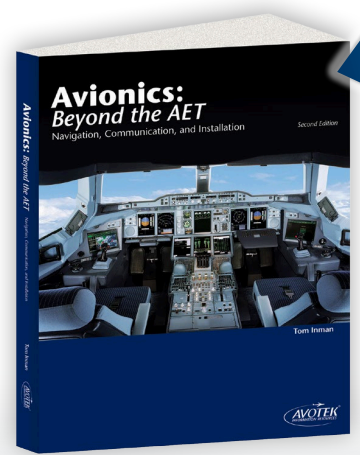
Participant #	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1	4	4	5	5	3	4	3	3
2	5	4	4	4	3	5	3	3
3	5	5	5	5	5	5	5	5
4	5	5	5	5	5	4	4	5
5	5	4	5	5	5	4	4	5
6	5	5	5	5	5	5	5	5
7	5	5	5	4	3	3	3	3
8	4	4	5	4	4	5	5	4
9	3	4	4	4	2	5	3	3
10	5	5	5	5	5	5	5	5
11	4	4	5	5	3	5	3	3

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WHAT AND WHO NEED TO BE DOCUMENTED IN THE LOGBOOKS

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ABSTRACT

It is common knowledge *and law*, that when aircraft maintenance occurs it must be documented in the aircraft records, following Title 14 of the *Code of Federal Regulations* (CFR) section 43.9 or 14 CFR 43.11. Although it is listed in the regulation the items that must be included in the record entries, through professional interactions of the author, it appears to be misunderstood about who must be included in these record entries. Whether it is lost in 14 CFR 147 classroom training or a lack of attention to detail in the field, it is an important item that is often overlooked. In this paper, the author briefly goes more in depth on what, and who, must be included in these records with references to the CFR and a Federal Aviation Administration's Letter of Legal Interpretation on the topic.

Keywords: Aircraft logbook, Aircraft record, Owner-assisted annual, 14 CFR 43.9, 14 CFR 43.11

AN OVERLOOKED ISSUE

Being a Federal Aviation Administration (FAA) certificated Airframe and Powerplant (A&P) mechanic with an Inspection Authorization (IA), an FAA Designated Mechanic Examiner (DME) and Title 14 of the *Code of Federal Regulations* (CFR) section 147 aviation maintenance instructor has afforded a unique opportunity to witness the topic of this paper from several perspectives. 14 CFR 147 instructors at one time or another in their curriculums teach that one of the main duties of an IA is to perform annual inspections on aircraft that are operated under 14 CFR 91 regulations. Pilots and active mechanics alike, are pretty familiar with this process as it completely takes an aircraft out of service for some time and is typically the largest expense that the aircraft owner incurs at one time annually. Some of these expenses can be mitigated however, if the pilot/owner wants to undertake certain actions that they are allowed to perform under 14 CFR 43 Appendix A Paragraph (c) Preventative Maintenance. An issue that arises from this is, how to properly sign off the work that occurred. As a privately functioning A&P/IA and FAA DME, it is apparent that this information is either missing or not properly conveyed in the training environment. This is evidenced by how frequently A&P applicants and pilot/owners incorrectly respond when asked these questions either during an examination or through conducting normal business conversations.

WHAT IS ALLOWED

The A&P with IA performs the aircraft's annual inspection. This is mandated in 14 CFR 65.95 where it states "Inspection authorization: Privileges and limitations. (a) The holder of an inspection authorization may - (1) Inspect and approve for return to service any aircraft or related part or appliance (except

any aircraft maintained in accordance with a continuous airworthiness program under Part 121 of this chapter) after a major repair or major alteration to it in accordance with Part 43 [New] of this chapter, if the work was done in accordance with technical data approved by the Administrator; and (2) Perform an annual or perform or supervise a progressive inspection according to § 43.13 and § 43.15 of this chapter" (Certification: Airmen Other than Flight Crewmembers, 2019).

The list of *minimum* items to be included in the annual inspection are spelled out in CFR Part 43 Appendix D. Once the inspection has been completed, a record is required to be made of the inspection following the requirements of 14 CFR 43.11. The interesting thing about this requirement for an annual inspection is, that it does *not* provide allowance for another person to be listed in the entry, but only the inspector who is signing it off. This is a very different requirement than non-inspection entries that are written following 14 CFR 43.9.

14 CFR 43.9 Content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records (except inspections performed in accordance with 14 CFR 91, Part 125, § 135.411(a)(1), and § 135.419 of this chapter), lists in paragraph (a) item (3) "The name of the person performing the work if other than the person specified in paragraph (a) (4) of this section" must be included in the entry in addition to the person signing off the work (Maintenance, Preventative Maintenance, Rebuilding, and Alteration, 2019).

Why is that? The federal regulations are pretty clear that the inspection must be completed by the person who is appropriately rated. It is not allowed to be done by another or by supervision. Conversely, with items that are not inspection, such as maintenance, overhaul, rebuilding, etc., those may be performed by a person not specifically rated for that task *if* they are supervised by an appropriately rated person who is. That is a great privilege of the A&P certificate! This allows the A&P to supervise and train others in almost every aspect of maintaining an aircraft, just not supervise another person completing the annual inspection.

LEGAL INTERPRETATION

This reality has caused some confusion as to what the record entry actually requires. The author, through active aircraft maintenance and through regular interaction on public aircraft internet forums, has learned that it is not clear to all aircraft pilot/owners or technicians. The FAA has formally responded to this question with a letter of interpretation titled "What Tasks Must be recorded in an Aircraft's Maintenance Record, and Whose Names Must Appear in those Maintenance Records Under 14 CFR 43.9 (a)" from their Office of the Chief Counsel dated May 4, 2016.

In this letter, the FAA restates that all items listed as preventative maintenance must be recorded under 14 CFR 43.9(a), and that each person who maintains, performs preventative maintenance, etc., must make an entry or their name be listed in the entry to satisfy the record requirement. The letter also dives a bit deeper on this rule and states that each situation is a case-by-case scenario, and if the task rises to the level that 14 CFR 43.9(a) requires it be recorded, then you must provide the names of the person performing the work (Peter, 2016).

INSPECTIONS ARE NO DIFFERENT

Since the regulations limit only the person holding the Inspection Authorization to perform the annual inspection, the record entry following 14 CFR 43.11 being completed after the inspection while being signed off, only has the inspector's name/signature because the IA is the *only* person allowed to perform the inspection. Often, the pilot/owner gets involved with these inspections as an "owner-assisted annual." In this arrangement, the pilot/owner *assists* the IA. The pilot/owner *cannot* be supervised doing any of the inspection items because the regulations forbid it.

The same FAA Letter of Interpretation expands on this regulation as well. They state that if the task the owner performs during the owner assisted annual does *not* rise to the level of preventative maintenance or maintenance, then no entry including their name be listed is required. But, if the pilot/owner performs a task that rises to that level, then a separate entry following 14 CFR 43.9(a) listing the work and their name is required (Peter, 2016).

This means that work completed during the owner assisted annual inspection may require two separate record entries to legally cover all those service items that occurred to the aircraft during the annual inspection. One with the owner listed and the items the owner performed following 14 CFR 43.9 and a second entry from the inspector following 14 CFR 43.11 addressing the inspection that they themselves performed.

BRING IT TO THE CLASSROOM

On the surface these don't appear to be large issues but they have a significant need to be addressed. Perhaps in the 14 CFR 147 training schools it could be covered more in depth in a federal regulation's course, or in an aircraft inspections course where students would be looking at records more thoroughly and perhaps interacting with potential pilot/owner customers. After all, part of doing an inspection is reviewing the records thoroughly and looking for unauthorized work. Supporting evidence found in the FAA's legal interpretation offers plenty of guidance on how to take meaning from these record-keeping regulations. Another

possibility is that this information should be brought into the 14 CFR 141 flight training courses. The pilot/owner needs to be just as aware of how to document the work they are authorized to perform on the aircraft as the technicians are.

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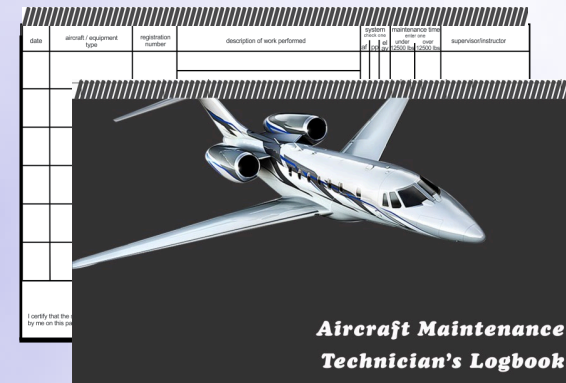
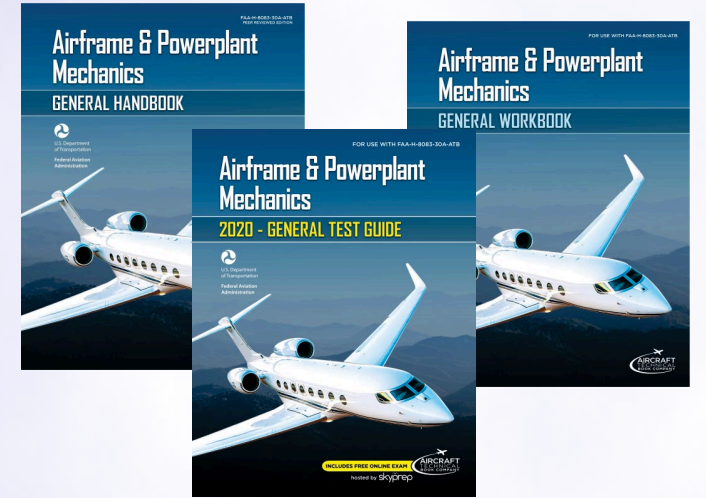


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