



*777 engine donated to South Seattle College by Boeing*

## **Evaluation of the Introduction to Aviation Maintenance Technology Program**

“With more than 300 employers operating on site, the airport offers extraordinary potential for career growth and development. This report validates the interest and ability of the airport workforce to develop their skills for long-lasting aviation careers. Critically, at a time when stable and good-paying jobs are very much in need, this report identifies the most efficient education and training tools to advance airport careers.”

*-- Commissioner Sam Cho  
Port of Seattle Commission*

**PORT**  **JOBS**

## Acknowledgements

Many thanks to the Port of Seattle for funding this program, and to Alaska Airlines for providing scholarships to Aviation Maintenance Technology (AMT) students. Our gratitude to Boeing for providing critical STEM investments in our onsite Airport University math classes at Sea-Tac Airport. We are also grateful to Delta Air Lines for providing a tour of their maintenance hangar and speaking at the AMT information sessions, and to the many employers who shared AMT flyers with workers.

We also appreciate the great partnership we forged with South Seattle College and the wonderful and caring instruction provided by the team teachers. Finally, we want to recognize and thank the AMT students, all of whom work at Sea-Tac Airport, and who found time to balance school, work and family life into their busy days. We appreciate all the insights and experiences you shared as part of the evaluation and will use your feedback to inform our work. Your hard work will contribute to the development of diverse pathways to AMT jobs.

**Heather Worthley**

*Executive Director*

Port Jobs

July 2020



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# 1 Background

This report presents the results of an evaluation of the Introduction to Aviation Maintenance Technology (AMT) Program, which was implemented at Sea-Tac Airport in the winter of 2020.

Planning for this Port of Seattle-funded project began in the summer of 2019. The Port of Seattle, South Seattle College (SSC), and Port Jobs worked together to:

- Create a free *Introduction to Aviation Maintenance Technology* course taught at Sea-Tac Airport through Port Jobs' Airport University program;
- Recruit airport employees interested in AMT careers to participate in the course with the goal of enrolling in the highly rigorous two-year Federal Aviation Administration (FAA)-approved AMT program at SSC;
- Embed academic supports, financial aid application and funding assistance, college advising and career navigation to enhance student success.
- Provide Alaska Airlines-Airport University scholarships to class completers who successfully enroll in SSC's AMT program.
- Assess the ongoing progress of the AMT pathway and make adjustments and improvements along the way.

The AMT career pathway was identified by the Port of Seattle because it is a high demand occupation leading to a family wage earning job. The average annual job opening projections for Seattle-King County for 2017-2027 revealed a robust job market.

The 2019-20 Pipeline Report issued by the Aviation Technician Education Council noted a continued need to fill the skilled-worker pipeline to meet the long-term forecast for technicians; mechanics are retiring faster than they are being replaced. The report findings included the recommendation to increase efforts to highlight aviation careers. The Port of Seattle has

taken action by investing in the research that led to the AMT Career Pathway, and in the role that Port Jobs plays in building talent pipelines to aviation jobs.

# 2 Research Methods

An independent consultant, Business Government Community Connections, conducted this evaluation under a contract with Port Jobs. A prototype approach was utilized in order to give the project team an opportunity to develop and test ideas, and determine how well the iterative model is working. The research approaches and methods included the following:

- Interviews with 16 of the 17 AMT students in the Introduction to AMT class and one student who withdrew. Students were given \$25 gift cards for their participation and to acknowledge the value of their time.
- Interviews with the South Seattle College basic skills and academic instructors, who acted as "team teachers."
- Interviews with the SSC-based Workfirst/Basic Food Employment & Training Program Specialist and the ESL Career Pathways Navigator.
- Interviews with the Airport University Manager.
- AMT classroom visits and observations.
- Collection and analysis of AMT demographic data, assessment, enrollment, completion and transition to South Seattle College AMT program data.
- Conversation with Basic Education for Adults I-BEST Pathway representatives from the Washington State Board of Community & Technical Colleges.

The above information was coded, entered and combined:

- to develop an understanding of the project design and operations and
- to identify the factors contributing to, or hindering AMT student progress and success.

*Attachment A lists key respondents.*



# 3 Key Findings

The findings below are displayed using a Question and Answer format. The feedback from AMT students is woven throughout this document.

## Q1. How was the Introduction to AMT program designed and implemented?

The main partners were the Port of Seattle, South Seattle College and Port Jobs. All worked together to plan, implement and evaluate the program.

**The Port of Seattle** – invested in this program, provided strategic guidance, and championed career pathway strategies with employers.

**Port Jobs** – drew upon connections to airport workers and employers drew upon connections to airport workers and employers to recruit and assess participants; provided onsite program and classroom coordination; offered in-class assistance and persistence support; facilitated linkages to financial aid assistance and other resources.

**South Seattle College** – offered the Introduction to AMT course at the airport using a team teaching model; supported access to workforce funding and course advising assistance.

Both Port Jobs and SSC participated in the collection of demographic, assessment, course enrollment, course completion, and financial aid access and student transition data. The partners worked well together. The program was rated as excellent or very good by students in each of following categories: recruitment, instruction, cultural competence and support services. The program was rated as good or satisfactory by students in the area of transition to South Seattle College planning. Several students noted that it was too soon to provide a comprehensive assessment of the transition planning efforts. The interview occurred between weeks 4 and 6 of the class. Post-class interviews were not conducted as planned, due to the interruptions caused by novel coronavirus.



**Checking out the parts inventory in the Delta Air Lines maintenance hangar**

Features which AMT students reported that they liked included:

- Free tuition
- Alaska Airlines – Airport University Scholarship Program
- Math support and 1:1 after class tutoring
- College advising during class
- Financial Aid assistance during the class
- Tours of the Delta Air Lines maintenance hangar
- AMT information sessions
- The way the SSC teachers and Port Jobs staff worked as a team
- On site (airport-based) instruction
- Referrals by Port Jobs for subsidy eligibility supports

The program curricula focused intensively on math and other fundamental skills needed to prepare students for the two-year AMT program at South Seattle College. Students were deliberately given time for academic advising, and visits to sites where they could see what aviation maintenance technicians do firsthand.

The course outline is presented below:

### Introduction to Aviation Maintenance Technology Syllabus:

<b>Week 1:</b>	Explain the SSC AMT Program, what the Introduction to AMT class will cover, unofficial math assessment
<b>Week 2:</b>	Administer CASAS assessments (Reading and Math)
<b>Week 3:</b>	Financial Aid workshop, whole numbers, multiplication and division
<b>Week 4:</b>	Fractions, decimals, percentages
<b>Week 5:</b>	Academic advising workshop, workforce applications, fraction/decimal conversion, ratio & proportion
<b>Week 6:</b>	Signed numbers, geometry
<b>Week 7:</b>	Field trip to SSC Hangar, Math Review
<b>Week 8:</b>	Review, Math CASAS assessment/ placement test
<b>Week 9:</b>	Measurement/conversion, Delta Air Lines maintenance hangar tour
<b>Week 10:</b>	Reading and using maintenance manuals
<b>Week 11:</b>	Basic physics, aerodynamics, parts of an airplane

### Q2. What kinds of recruitment efforts were conducted by Port Jobs?

Materials promoting the AMT class were broadly distributed at Sea-Tac Airport through multiple communications strategies. Materials promoting the AMT class were broadly distributed to Sea-Tac Airport employees through multiple communications channels. Airport companies were informed of the program through emails and presentations at Port of Seattle-hosted employer meetings.

Additionally, Port Jobs hosted two AMT information sessions at the Airport Jobs office in December 2019. Thirty airport employees attended. South Seattle's AMT instructor led the session with an Adult Basic Education (ABE) instructor and a workforce funding specialist. South Seattle's AMT instructor led the session with the Adult Basic Education (ABE) instructor and a staff person who had expertise in how to get workforce funding.

Information sessions included:

- A panel of Delta Air Lines mechanics who described what an aircraft mechanic does and what the job is like.
- An overview of the Introduction to AMT class, including course dates, time, key topics and benefits of the class.
- A summary of the two-year AMT program at SSC, including class days, times, cost, enrollment periods, course sequencing, and funding options.
- A career outlook for mechanics.

As a result of these efforts 37 workers began the Introduction to AMT pre-enrollment process, which included completing an enrollment form, attending an information session and taking a reading and math assessment. Of these 37 workers, 23 enrolled in the class. Of the 14 who did not enroll, the reasons varied: two could not change their work schedules and were unable to attend the class; two were not eligible because they no longer worked at the airport; five were waitlisted due to the maximum class capacity; and five declined to complete the enrollment process.

### Q3. Who was enrolled in AMT?

**Ethnicity and Language:** Twenty three students were enrolled in the AMT program. The majority (96%) were persons of color. Eight students spoke at least one other language in addition to English, including French, Spanish, Thai, Amharic, Swahili and Tagalog. The recruitment of a diverse student body reflected the commitment of the Port of Seattle and Port Jobs to build inclusive talent pipelines to family wage jobs.

Race	Number/Percent
African/African-American/Black	8(35%)
American Indian or Alaska Native	0(0%)
Asian	6(26%)
Caucasian/White	1(4%)
Native Hawaiian or Pacific Islander	2(9%)
Spanish/Hispanic/Latino	3(13%)
Other	2(9%)
Not Reporting	1(4%)
<b>Total</b>	<b>23(100%)</b>

**Gender:** Five (22%) of the students were female and 78% male.

**Age:** Seventy percent were 21 to 39 years of age; 22% were in the 40-49 year old category; and 8% fell in the 50-65 year old category. The ages ranged from 21 to 55.

#### Employment

As stipulated by this project's eligibility requirements, all students were working at Sea-Tac Airport when they enrolled in the Introduction to Aviation Maintenance Technology class. They were employed in many different types of jobs. Examples included ramp agents, supply attendants, cargo agents, passenger service agents and baggage handlers. Many worked 40 hours a week and a few had variable work hours, ranging from 25 to 40 hours a week. Six students had worked at the airport more than five years.

The length of employment for students ranged from 1 to 15 years, and averaged 5 years.

This is where I want to work forever. I feel at home when I am at work.

I love being a ramp agent. But I know I can do more and have more to accomplish.

The airport is a great place to advance in a job. I can't believe that this class is free. It sends a message that the Port of Seattle cares about its employees.

-- AMT students

**Education:** Over a third (35%) had a high school degree or GED; 47% had taken one or more college courses (not leading to a degree), and 18% had previously earned either an AA or BA degree. One student who had not been to school for thirty years said, "Before, I went to school because I had to. Now, I go to school because I want to!"

**Family Responsibilities:** In addition to working and going to school seven of the students had one or more children. A total of 18 children were, as one student put it, "behind-the-scenes beneficiaries of the AMT program." Their ages ranged from 1 to 17.

I took this training to show my 4 and 6 year old children that school is important. I want to earn more so they have more.

-- AMT student

### Q4. How were students assessed?

During the pre-enrollment period, students took the Comprehensive Assessment Student Adult System (CASAS) Employability Competency System Appraisal Form 130. The results from this test helped the teachers know more about the needs of the student body so that they could plan their lessons. One of the South Seattle instructors emphasized that this tool was not used to screen students out, but rather to give instructors a chance to learn more about the math and reading skill levels of students. Students were told that there was no "passing" score. The assessment revealed that at least half of the students needed to improve their math skills; on average students answered 10 of the 25 math questions accurately. The reading tests were much higher, with students answering 18/19 of the 25 questions accurately.



During week 2 of class, the CASAS reading and math tests were administered. Because the Introduction to AMT class is run through the South Seattle College Adult Basic Education Department, pre- and post-CASAS tests were required. Again, student math scores underscored a need for improvement, and revealed that nine students would not yet meet the math entrance score requirements for the two year AMT training. All students, however, met the reading requirements; this eliminated the need for a post-CASAS reading test. Students were also assessed throughout the AMT program on the hybrid work that they completed on Canvas (the college's learning platform) and for their participation in class and on worksheets.

For future classes, possible changes to the pre-enrollment process include the use of a math screening test that is more closely tied to the kind of math done in the beginning of the South Seattle College AMT program.

#### Q5. What were the biggest challenges students faced?

The interviews with students revealed that their biggest challenges were in negotiating their work schedules in order to attend the Introduction to AMT class. Although some employers were helpful and supportive, others were already understaffed and less likely to alter work schedules to accommodate class sessions. One student said, "In theory Sea-Tac Airport employers want their workers to advance, but in practice some don't see the big picture – about how creating advancement opportunities really will make employees do a better job, and employers keep their workers." About one third also faced practical challenges of how to support their families while going to school (if they cut their work hours), and how to make time for their children while going to school and working.

#### Q6. How was the curriculum designed?

The Introduction to AMT course met twice per week for 2-hours per class over the 11-week quarter (44 instructional hours plus online homework). The AMT curriculum was designed to help students build the skills necessary to enter the two-year AMT program at South Seattle College. The pre-assessment test results helped the teachers know more about the



**AMT students visit the Delta Air Lines maintenance hangar**

needs of the student body so that they could plan their lessons accordingly. As a result they focused largely on math.

Some examples of the practical applications in math to prepare students for AMT jobs follow. The instructor noted that students will need to:

- Use integers, multiplication and division and algebra when calculating **weight and balance**;
- Know algebra, multiplication and division when calculating **torque and adjusting torque wrenches**;
- Know how to use measuring tools, fractions and decimals, and be able to convert from one to the other when performing **aircraft structural repairs or selecting hardware**;
- Calculate cylinder volume when learning about **engine cylinders and volumetric efficiency**;
- Understand geometry related to circles (arc, degrees) and Sine waves when learning about **Alternating Current** in the next class they will take at South Seattle College (AMT 112).

Observations of the AMT class revealed that the instructors worked as a team and provided complementary types of assistance instruction. Contextualized examples of math were embedded in the curriculum to help students see how what they were learning would be applied in the AMT workplace. Students really liked these examples, and a few recommended that in the future curricula integrate more real life examples in lesson plans.



### **Q7. Did AMT students increase their skills enough to qualify for entrance to South Seattle's two-year AMT program?**

All students increased their math scores on the post- CASAS math assessment, including the nine students who needed to increase their math score in order to be accepted to the South Seattle College AMT program. Only three of the nine students did not meet the qualifying scores for entrance to the program. These students are continuing to build their skills and have signed up for online math classes at South Seattle College in the spring, after which they expect to achieve the test scores necessary to be accepted to the full two-year AMT program. They will have the same instructor in their online course as they had in Introduction to AMT.

For all students, the Introduction to AMT program provided essential brush-up skills. For a handful, including the three who are going to take the online class, some material covered, as one student put it, "entirely new territory". Some of the students with higher pre-math scores said that the class gave them a chance to "relearn" or "refresh" their skills. One said, "I remember this stuff, but I did not really remember what it was like to go to school. This class gave a lot of us a chance to get back into that mindset and habit."

### **Q8. How many students completed the Introduction to AMT program?**

Of the 23 students who enrolled in the class, seventeen completed the AMT course. The completion rate (74%) for this program was strong, especially considering the daunting schedules that many AMT students had to maintain and negotiate in order to attend the class, and the rigorous nature of the class. Students attended four hours of class per week and did additional work on their own at home. At least one third also did extra work outside of class in order to build their math skills, using resources suggested by the teachers.

Six students did not complete the class for a variety of reasons. Two dropped out due to work schedule conflicts and understaffing at work. Another missed more than half of the classes due to work schedule challenges and health reasons. One student dropped for financial reasons, while another felt the class was

overwhelming. Two dropped out for work-related reasons due to work schedule conflicts and understaffing at work. One student missed more than half of the classes due to work schedule problems and health reasons. One student dropped out for financial reasons. One student who had low math and reading scores, dropped out after the first week of class because she felt that the class was overwhelming. Lastly, one student who had signed up for the class did not attend.

### **Q9. Do students plan to transition to the South Seattle College two-year AMT program?**

Ten students enrolled in the spring 2020 AMT program at South Seattle College. Due to the novel coronavirus epidemic, South Seattle College decided to offer only online classes during spring quarter 2020. FAA guidelines do not permit the first AMT class to be offered online to new students. As a result, these 10 students will have to wait until regular in-person classes resume in Fall 2020 to begin the program. Three other students plan to start in fall as well. One student decided to pursue an Aeronautical Science BA program at Green River College in Spring 2020.

The help we got from Port Jobs and South Seattle College to fill out financial aid applications was great.

Technical assistance on all the paperwork required really helped. I don't think I could muster the energy to figure out this stuff.

I like that we did the applications in class – because that made me think forward to my future as an Aviation Maintenance Technician.

I would never have been able to weed through all the regulations and get this paperwork in on time – thank you!

-- AMT students

### **Q10. Did students access the tuition assistance needed to transition to South Seattle's AMT program?**

All of the 16 students who will enroll in the AMT program will receive \$1,000 Alaska Airlines-Airport



***Last day of Introduction to AMT at Airport University, Sea-Tac Airport***

University scholarships, and will be eligible to apply for additional scholarships in the future. Sixteen of the 17 students submitted applications for Worker Retraining funding and are eligible to receive assistance. At the writing of this report the exact amounts of funding they will receive from this grant are unknown. The one student who did not yet submit a Worker Retraining application is planning to attend the AMT program in fall 2020.

Fifteen of the 17 students submitted Financial Aid- Federal Student Aid (FAFSA) for both the 2019-2020 and 2020-2021 school year. The status of awards is not yet known as of the writing of this report. In addition, one student applied for and received a Washington State Opportunity Scholarship for the spring 2020.

The process to help students get funding for tuition is time consuming and complicated. Setting aside time in the Introduction to AMT schedule to work on this was essential. The project team pondered the advantages of offering the Introduction to AMT course more than quarter in advance of the South Seattle AMT course as this would give the instructors an opportunity to focus more on curriculum and ensure that students have funding and enrollment processes in place. One instructor noted, though, that they would have to balance this decision with the potential to lose students during that interim quarter. To mitigate this problem she suggested that having a weekly workshop of some type could be useful.

## 4 Summary Observations

The design of the AMT program held up very well as did the recruitment, instruction and career advising strategies. Student ratings of their experiences in the program were positive, as were completion and planned transition rates to South Seattle's two year AMT program. Even though the novel coronavirus epidemic resulted in the last two weeks of the class having to be completed online, all students finished their post- assessments, coursework and applications for financial aid. Many were excited about their future careers as AMTs, and were extremely grateful for the scholarship assistance from Alaska Airlines, and the opportunity to take a tuition-free class located at their workplace. One student said, "When programs like this become better known, more people will want to come to Sea-Tac Airport to work." Another student was appreciative of the services that Port Jobs offered, and said, "I know if my current employer can't work out a schedule that meets my school schedule Port Jobs will help me look for a job and stay employed at the airport. Their staff is always providing me with information to help me advance and think about career pathways."

The extensive planning that went into the project paid off, and will provide a solid foundation for launching other similar initiatives in the future. The model builds on the evidence based practices of the Integrated Basic Education and Skills Training (I-BEST) team teaching, contextualized learning model. The Introduction to AMT program also integrates proven coaching and advising strategies which promote college persistence.

When the results of the project were shared with the State Board of Community & Technical Colleges (SBCTC), Policy Analyst Will Durden responded that “SBCTC research shows us that pathways need to be built backwards from the highest level of attainment needed for a secure labor market entry and progression. South Seattle College’s new AMT I-BEST launches students on their AA degree journey to median wages of \$33.64 an hour. The career pathway partnership with Port Jobs extends the pathway to prepare a more diverse student population for entry into I-BEST.” The AMT program is also building a strong pipeline to diversity (ethnic and gender) in AMT employment and family-wage jobs.

Student feedback (using the words of students) underscores that the following strategies are critical to sustain in future introductory classes at the airport:

- free tuition
- access to scholarships
- financial assistance planning
- teachers who relate well to students
- patient math instruction, that pushes us to excel
- orientations that bring the training to life
- workforce tours that show the excitement of AMT jobs
- opportunities to talk with people working as AMTs
- instruction that shows how basic skills are employed in job
- career coaching; and instruction that allows for 1:1 assistance for people who need extra help
- understanding of the types of airport jobs workers have and want, and challenges they face getting employer buy-in to their taking courses during work hours
- support services (such as access to resources for books and transportation)



**Students visit South Seattle College AMT program**

Students identified the need for referrals to childcare, transportation, and subsidy assistance. Some said these needs could be even more pronounced when they return to school, especially if they experience reduced work hours. In addition, the Introduction to AMT class demonstrates that future classes need to be assessment-driven, and designed to ensure that students receive the individualized assistance, instruction and guidance necessary to succeed.

Each of the AMT student’s journeys to become an AMT is underway. The AMT Partners will need to continue working together to track the transition success of students who enroll into the two-year program, and to launch future AMT or other introduction to aviation programs. They will need to be flexible in the design of program curricula, as future classes, for example, may include more English Language Learning students, and/or students who also need to focus more on reading, as well as math.

The Port of Seattle and AMT partners may also want to launch a quality jobs-focused campaign which underscores the necessity and benefits of supporting the career advancement efforts of all workers.

This strategy could be promoted as a promising approach for retaining and upskilling workers, and efficiently replenishing (backfilling) their workforce with jobseekers. The word-of-mouth and positive press associated with such a campaign would draw attention to the work and values of the Port of Seattle, and shine light on the expectation that all employers engaged in the airport economy share a common commitment to worker advancement.



## Key Respondents

Name	Role In Project	Title
Rebecca Yedlin	Basic Skills Introduction to AMT Instructor	Transitional Studies Faculty South Seattle College
Teresa Romaneschi	ESL Career Pathways Navigator	ELL Transitions and I-BEST Coordinator South Seattle College
Sean Cargill	Introduction to AMT Instructor	Instructor Aviation Maintenance South Seattle College
Joshua Little	Workforce Program Specialist/ Tuition Assistance	Workfirst/BFET Program Specialist WorkSource Affiliate at South Seattle College
John Bowers	AMT Design Team Member/Advisor	Basic & Transitional Studies Dean South Seattle College
Veronica Wade	AMT Design Team Member/Advisor	Executive Dean Professional Technical and Workforce Education South Seattle College
Stephanie Kellner	Recruitment, Career Coaching, Project Coordination	Airport University Program Manager Port Jobs
Heather Worthley	AMT Design Team Member/ Project Oversight	Executive Director Port Jobs
Luis Navarro	Port of Seattle AMT Project Liaison of Seattle	Director Workforce Development Programs Port of Seattle



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*Students visit the South Seattle College  
AMT program*

## PORT JOBS

*Students check out the training hangar at South Seattle College*

