

AOPA FOUNDATION HIGH SCHOOL AVIATION STEM CURRICULUM

**Building CTE STEM Pathways and
Giving Wings to Your Students' Dreams**

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AOPA Foundation
You Can Fly High School Initiative





Aircraft Owners and Pilots Association (AOPA)

The largest aviation community in the world.

Our Goal

Ensure that the sky remains within reach of
EVERYONE who dreams of becoming a pilot.

AOPA Foundation

Philanthropic arm of AOPA that promotes and funds
aviation education and safety initiatives.



Why Aviation Education?

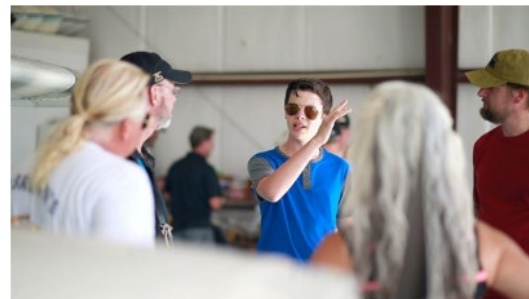
Today's high school students WILL BE tomorrow's
aviation STEM professionals.



High Schools



Ambassadors



Flying Clubs



YOU CAN FLY
AOPA FOUNDATION



Flight Training



Rusty Pilots

Why teach aviation STEM?

2021-2040 New Personnel Demand

North America: 432,000 Jobs

Worldwide: 2,124,000 Jobs



Pilots
130,000



Technicians
132,000



Cabin Crew
170,000

Sources:
Boeing Pilot and Technician Outlook 2021-2040

Why teach aviation STEM?

US Drone Footprint

Commercial

Remote Pilots: 269,030

Registered Drones: 321,370

Recreational

TRUST Certificates: 220,891

Registered Drones: 529,820



Sources:

Business Insider, [FAA Website: Drones by the Numbers](#), March 21, 2022

What is the AOPA High School Aviation STEM Curriculum?



- Four-year STEM-based curriculum
- Two CTE pathways
- Prepares students for aerospace careers
- Teaches all concepts tested on FAA Knowledge Tests
- Built for teachers by teachers who are pilots and flight instructors
- Use as STEM, CTE, engineering, elective, or core science (some states) course
- Everything teachers need
- Available to any high school **FREE!**


What the Curriculum is NOT




- Private or drone pilot ground school
- Flight training
- Substitute for core science classes (in most states)
 - “Pick and choose” content
 - Non-credit programs

What's Included?


- **Web-delivered Curriculum**
- **5E model lesson plans**
- **NGSS, CCSS, and FAA ACS** standards
- **Teacher classroom presentations**
- **Instructional video links**
- **Pacing Guides**



GRADE 9
UNIT 2
SECTION D
LESSON 1



LAUNCHING INTO AVIATION
TAKING FLIGHT-EARLY AVIATION INNOVATIONS
POWERED, CONTROLLED FLIGHT



v1.0
HIGH SCHOOLS
POWERED BY AGPA

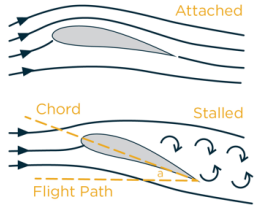
DESIRED RESULTS


ESSENTIAL UNDERSTANDINGS

ESSENTIAL QUESTIONS

HOW DOES ANGLE OF ATTACK AFFECT LIFT?

- **Lift is directly affected by angle of attack**
 - As the angle of attack increases, so too does the lift produced by the airfoil
 - This is true until the critical angle of attack is reached
- **At the critical angle of attack, the boundary layer of air separates from the airfoil and creates drag**
 - This is called an "aerodynamic stall"






HIGH SCHOOLS
POWERED BY AGPA

What's Included (contd.)?

- **Student activities and projects,**
- **Project rubrics,** and **Materials lists**
- **Extension activities/Multiple Entry Points**
- **Formative and summative assessments**
- Unit **quizzes and exams**
- Semester **Pre- and post-tests**
- **Teacher notes** and aids

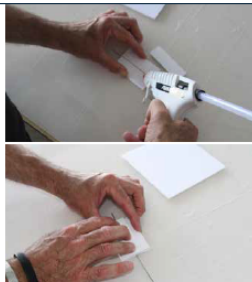


UNIT 2 | SECTION D | LESSON 2 | BUILD AND TEST A WIND TUNNEL | STUDENT ACTIVITY

 HIGH SCHOOLS
POWERED BY NASA

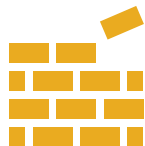
3 **AIRFOIL MOUNT**
Build the two side structures for the airfoil mount.

Put one of the pieces of wire between two of the 1" x 3" pieces of foam. You are not gluing the wire to the pieces; it is just providing a spacer. You will pull the wire out once the side structure is assembled. Apply hot glue to the inside of both foam pieces and center another 1" x 3" piece of foam on top. Press down and let the glue cool.





AOPA Foundation Curriculum Offerings



Grade 9

Intro to Aviation
Aerospace History
Engineering Design



Grade 10

Forces of Flight
Aircraft Systems
Aircraft Performance



Grade 11 Pilot

Weather
Airspace
Flight Planning



Grade 12 Pilot

Instrument Flight
Advanced Aircraft
Future of Aerospace



Grade 11 UAS

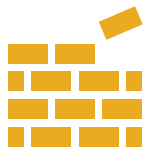
Weather
Airspace
Drone Operations



Grade 12 UAS

Advanced Missions
Advanced Drone Tech
Future of Aerospace

AOPA Foundation CTE Pathway Topics



Grade 9

Aviation STEM
career exploration



Grade 10

Research and apply
for school-to-work
opportunities



Grade 11 Pilot and UAS

Resume
Cover letter
Letters of recommendation
Entrance essays



Grade 12 Pilot and UAS

Aviation business plan
Response to NSF RFI
CTE capstone project

Flexibility in implementation

Select the course(s) that best fit(s) your program's needs



Grade 10 and 11 cover FAA Knowledge Test content



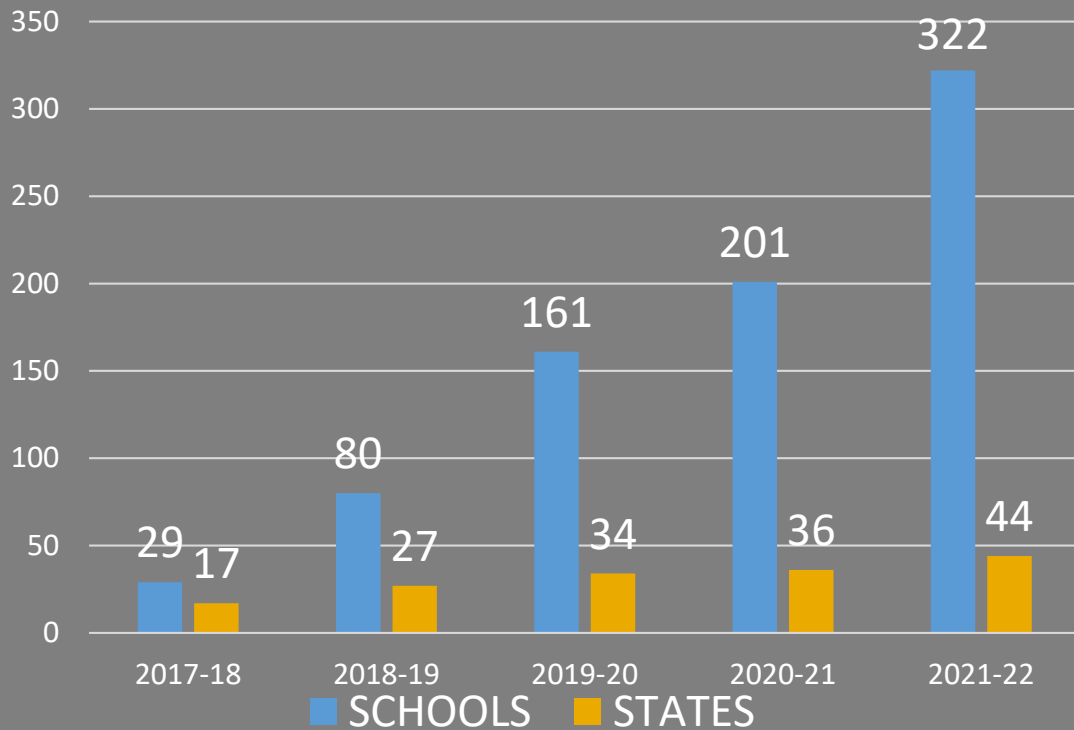
Courses have a natural year-to-year flow



Mixed grade levels in one course



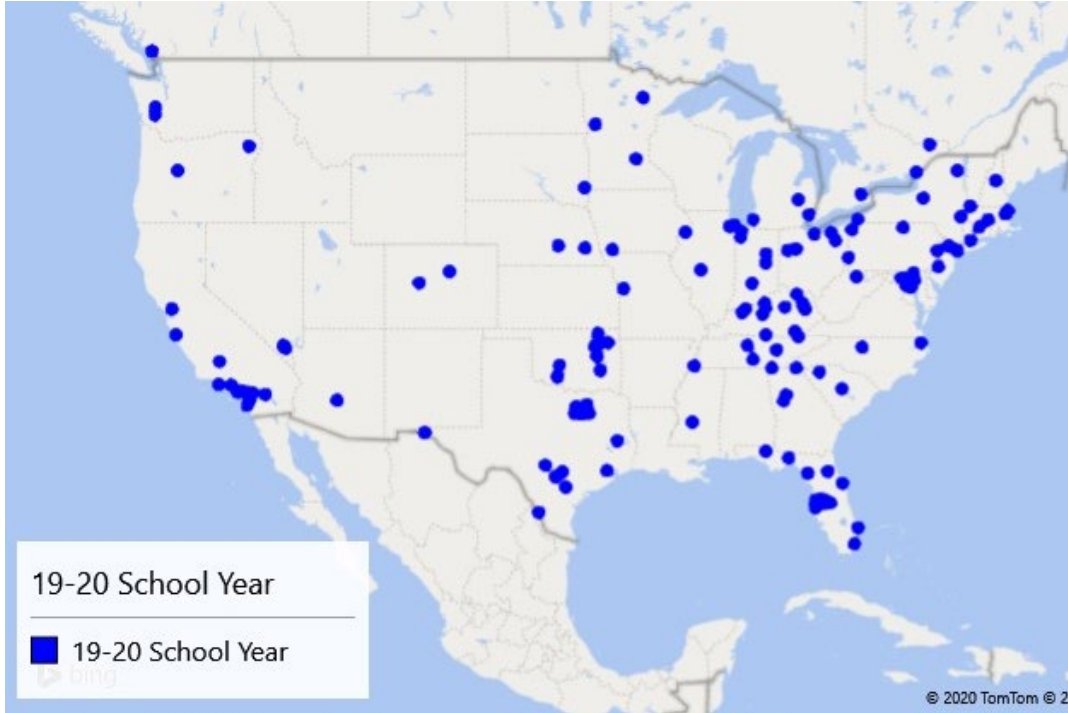
HIGH SCHOOL **GROWTH**



- 62% increase in number of schools compared to previous year
- 22% increase in the number of states

100% renewal rate

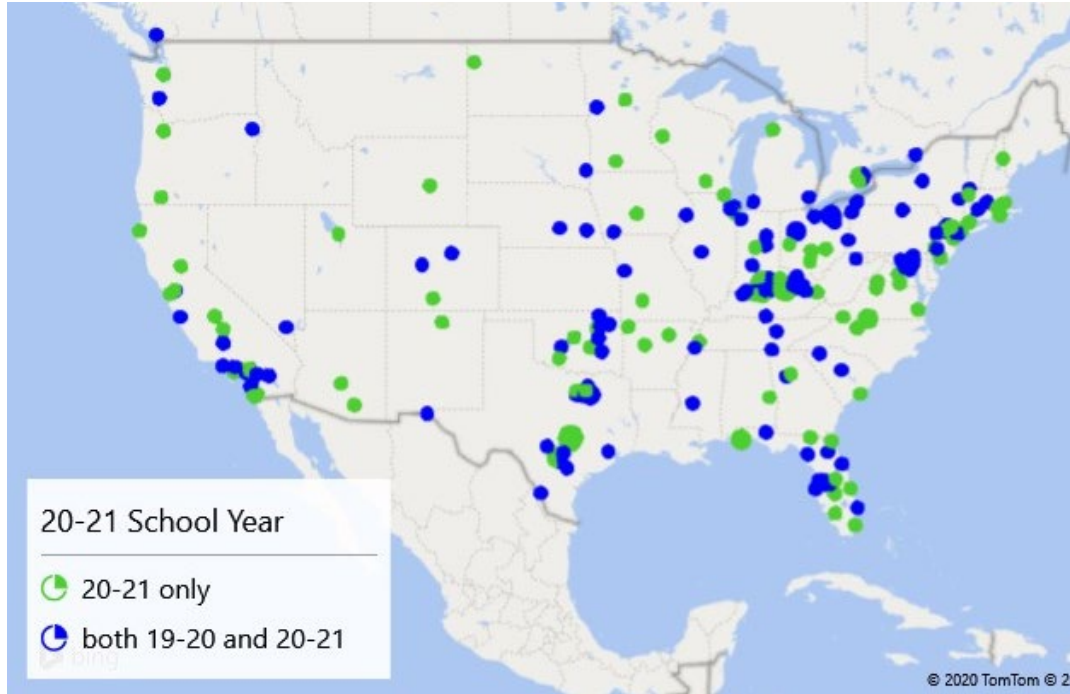
Where is the Curriculum being used?



2019-2020 School Year

- 160 schools
- 34 states
- ~5,000 students

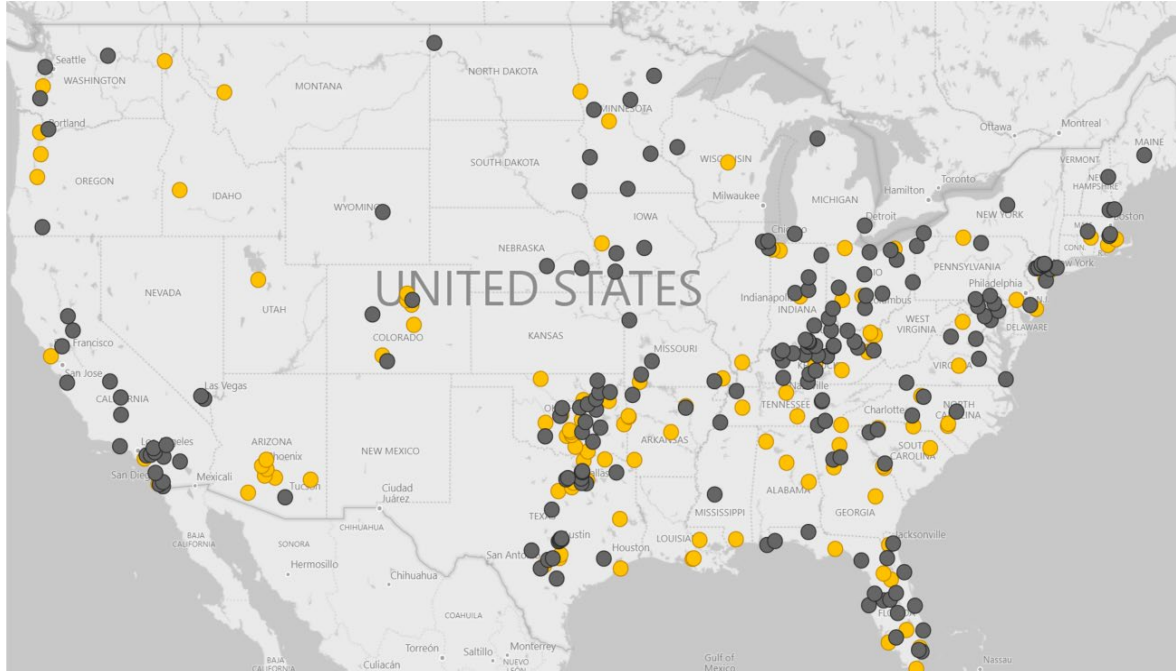
Where is the Curriculum being used?



2020-2021 School Year

- Over 200 schools
- 36 states
- 255 teachers
- ~8,000 students

Where is the Curriculum being used?

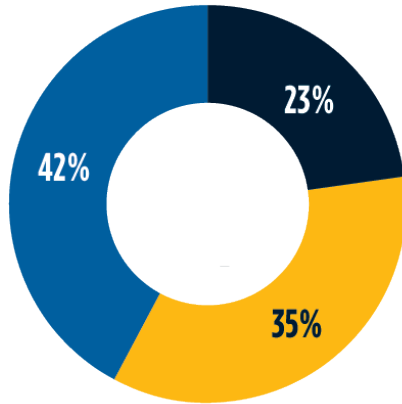


201-2022 School Year

- 322 schools
- 44 states
- 400 teachers
- 10,000 students

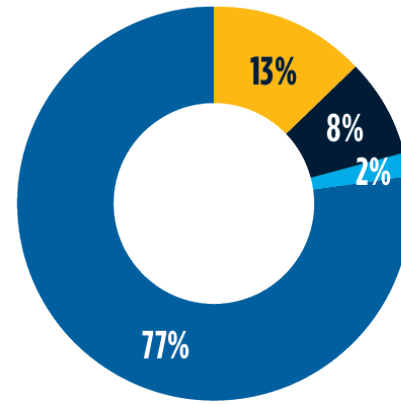
2021-2022 School Type and Location

SCHOOL LOCATION



■ Rural ■ Urban ■ Suburban

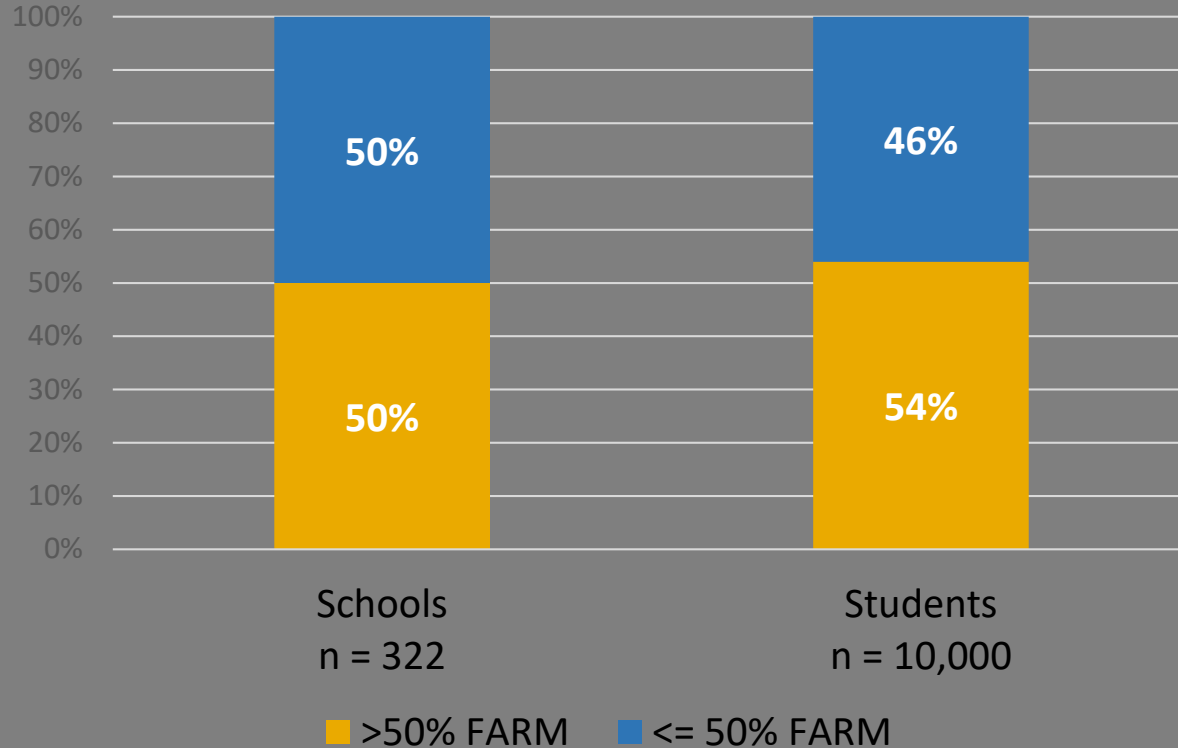
SCHOOL TYPE 2021-22



■ Public ■ Private ■ Charter ■ Other

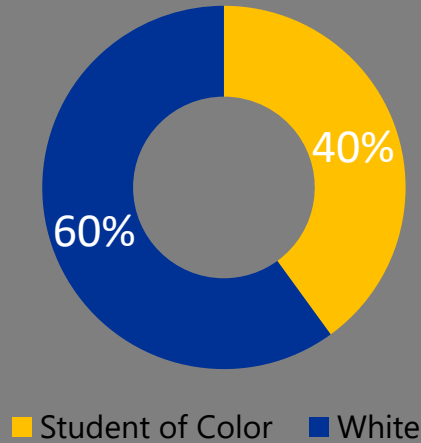
2021-2022 Poverty Level Data

AOPA Foundation Students and Schools by School Schoolwide Title I Eligibility Status

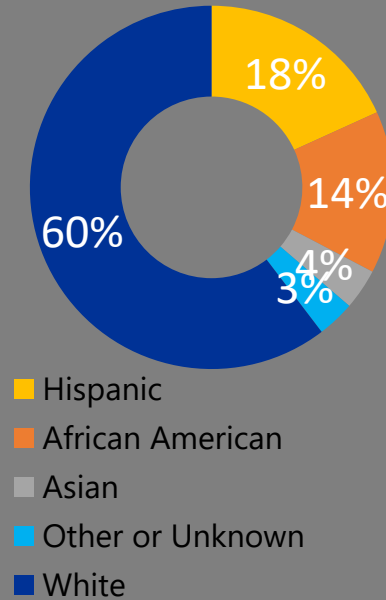


2021-2022 Student Demographics

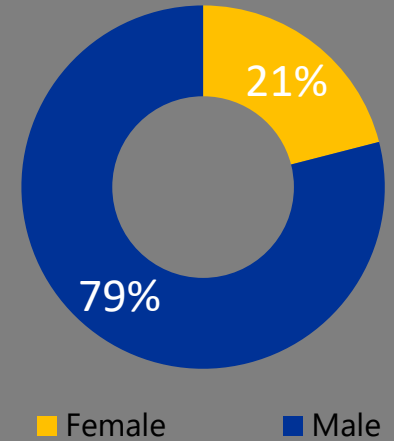
ETHNICITY 2021-22



ETHNICITY DETAIL 2021-22



GENDER 2021-22



2020-2021 Aviation Career Milestones

In the first six weeks of 2021-2022 school year

Started
Flight Training

482

Private Pilot
Knowledge Test

40

566 MILESTONES

Drone Pilot
Knowledge Test

38

Private Pilot
Certificate

6

Curriculum Impact: **First Graduation Cohort**

Post-graduation Career and **Additional Education Intentions** n = 190

More than 50%

Intend to **pursue**
aviation related careers

- Pilot or Drone Pilot
- A&P or avionics technician
- Aviation-related engineer
- Other aviation-related career

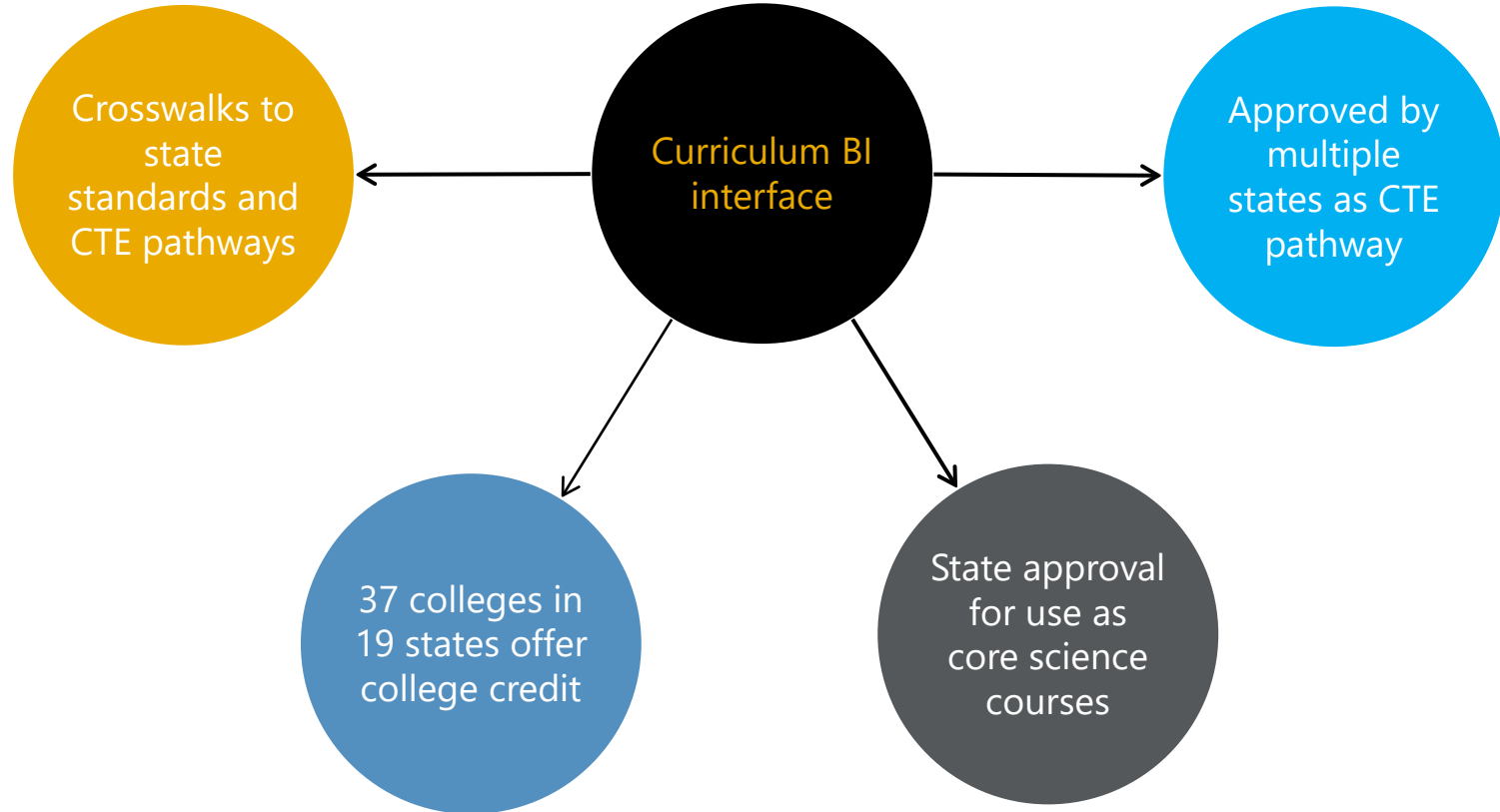
More than 75%

Intend to pursue
post-secondary education

- Two- and four-year colleges
- AMT programs
- Technical schools
- Flight training programs

Curriculum Impact: Post-secondary Pathways

CTE Career and Post-Secondary Education Partnerships



Who can teach the Curriculum?

- **We don't require**
 - Pilot certification
 - Math or science certification
- **Look for**
 - **Interest** in aviation STEM
 - **Willingness** to learn
 - **Passion** for putting students on path to aviation and other STEM careers
- Know your state and postsecondary partner **certification requirements**



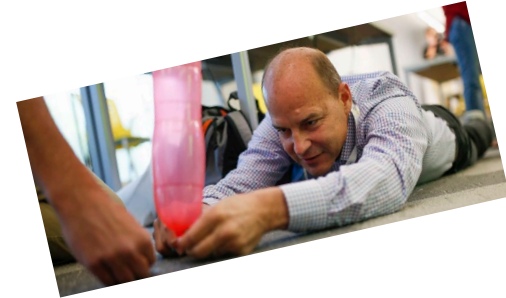
AOPA Foundation's commitment

FREE

- Program planning support
- Online teacher training videos
- CE credits for PD from ERAU
- Ongoing teacher and program support
- Networking opportunities
- State course approval support

FEE-BASED

- In-person teacher training
- Annual Aviation STEM Symposium



What's a school's commitment ?

- Teacher is a paid or contracted employee
- School/District administration support
- Use Curriculum in its entirety
- Offer courses for high school credit
- At least five students per course per semester
- Teachers must attend AOPA PD
- Complete periodic data collections

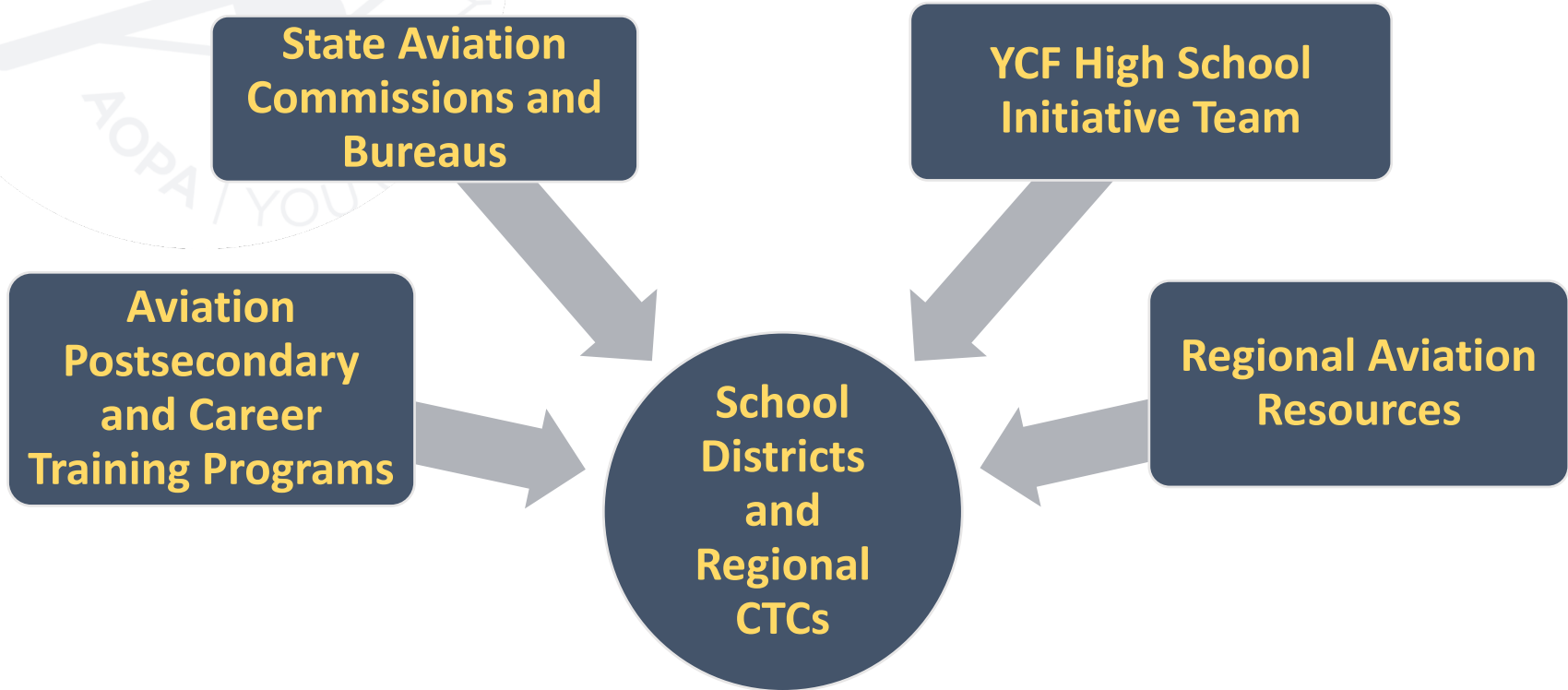


Expanding Aviation Opportunities

- Build regional center pathways to aviation STEM careers
- Engage aviation colleges and businesses as regional career pathways
- Pursue statewide adoption as approved CTE pathways
- **Coordinate recruiting efforts with other aviation organizations**



RECRUITING CAREER PATHWAYS



Collaboration: Multiple Aviation Pathways

CAREER STRAND	GRADE 9	GRADE 10	GRADE 11	GRADE 12 SEM 1SEM 2	
PILOT	AOPA Grade 9 Course	AOPA Grade 10 Course	AOPA Grade 11 Pilot Pathway	AOPA Grade 12 Pilot Pathway	AOPA Semester 2 Capstone Project
UAS PILOT			AOPA Grade 11 UAS Pathway	AOPA Grade 12 UAS Pathway	

Collaboration: Multiple Aviation Pathways

CAREER STRAND	GRADE 9	GRADE 10	GRADE 11	GRADE 12 SEM 1SEM 2	
AIRCRAFT MAINTENANCE	AOPA Grade 9 Course	Choose Aerospace Year 1	Choose Aerospace Year 2	FAA AMT General Test Prep and AOPA Capstone Planning	AOPA Semester 2 Capstone Project
AICRAFT MANUFACTURE		Tango Flight Year 1	Tango Flight Year 2		

Strong today.
Stronger tomorrow.
Strongest together.





November 13-15
Peabody Memphis
AOPA.org/Symposium
**Sponsorships and
Exhibitor Space
Available!**

More Info

High School Initiative

<https://youcanfly.aopa.org/high-school>

Curriculum Website

<https://aopa.org/curriculum>

202 Symposium Website

<https://aopa.org/syposium>

High School Student and Teacher Flight Training Scholarships

<https://aopa.org/scholarships>

