

China's "Little Eagles"

People's Liberation Army

Developing its

Next-Generation Pilots

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雏鹰 (chú yīng): little eagles, or eaglets, in Chinese.

It is a metaphor frequently used in the Chinese military context to refer to young pilots preparing to become independent warriors in the sky.

China Aerospace Studies Institute

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Abbreviations

AUAF	Aviation University of the Air Force
CCP	Chinese Communist Party
CMC	Central Military Commission
DEP	Dual-Enrollment Program
IFT	Initial Flight Training
JROTC	Junior Reserve Officer Training Corps
NTAS	Naval Teenagers Aviation School
PE	Physical Education
PLA	People's Liberation Army
PLAAF	People's Liberation Army Air Force
PLAN	People's Liberation Army Navy
ROTC	Reserve Officer Training Corps
SCOL	Senior Colonel
STEM	Science, Technology, Engineering, and Math
TASAF	Teenagers Aviation School of the Air Force
TBAS	Test of Basic Aviation Skills
TCAF	Theater Command Air Force
USAF	United States Air Force

Introduction

In November 2017, then Secretary of the United States Air Force (USAF), Heather Wilson, said her service was short by 2,000 pilots, or about 10 percent of its necessary number, and sounded a dire prediction of what it would lead to. “With 2,000 pilots short, it’ll break the force,” Wilson was cited as saying.¹ In April 2018, a Government Accountability Office (GAO) report, titled *Department of Defense Needs to Reevaluate Fighter Pilot Workforce Requirements*, noted that the U.S. Air Force, Navy, and Marine Corps are each short about 25 percent of the fighter pilots they need in crucial areas.²

Looking across the Pacific Ocean, in 2018, China’s People’s Liberation Army Air Force (PLAAF) reported that it had “achieved the best aviation recruitment result both in quantity and quality” since it began to organize its self-directed recruitment program in 1988.³ The PLAAF’s 2018 aviation recruitment cycle attracted more than 123,000 high school graduates⁴ to apply, and through multiple rounds of selections and stringent testing. The PLAAF accepted 1,480 into its pilot training program in July 2018.⁵ In January 2019, the official PLA Navy’s (PLAN) Aviation Recruitment website also announced that more than 4,500 potential PLAN pilot traineesⁱ from 22 Chinese provinces had passed the preliminary selection for its 2019 recruitment cycle.⁶ By the time the PLAN wrapped up its 2019 recruitment cycle, despite the lack of a full disclosure of its total numbers, the PLAN declared that compared with that of 2018, “the total number of pilot cadets increased by 20 percent” and “the number of carrier-borne

i It should be noted that although the Naval Aviation announced in 2017, for the first time in its history, that it would recruit female aviation cadets, its 2019 aviation recruitment cycle does not open to female candidates. See: Yue Feifei (岳菲菲), “Naval Aviation recruitment numbers up, open to female pilots for the first time (2017海军招飞大幅增加 首次开招女飞行员)”, January 1, 2017, *Beijing Youth Daily* (北京青年报). Accessed at: <http://news.sohu.com/20170101/n477499357.shtml>.

aircraft pilot cadets increased by 41 percent,” which had set “a new record both in the number and the quality of the enlisted pilot cadets.”⁷

While assessing the U.S.-China military competition, the human element of the PLA is a key variable⁸ that needs to be evaluated. This includes the number of troops, the overall quality of personnel the PLA installs in key billets, and, equally important yet less-studied, through what means the PLA acquires its key talent. Similar to China’s leapfrog development of its military technological capability, the PLA has experimented with and chosen multiple “shortcuts” to accelerate its talent acquisition. In the realm of technology transfers, there has been an increase in the U.S. government’s awareness of China’s practice of “military-civilian fusion” (MCF/军民融合)⁹ - a process of routinizing application of know-how acquired by the civilian industry to advance the military sector, in recent years. What has not been adequately scrutinized is the Chinese military’s increasingly deliberate use of MCF to accelerate the development of its military personnel, particularly in the recruiting and training its pilots, as the PLAAF and the PLAN further expand their spheres of influence both within the PLA and outside of China’s borders.

The Chinese military regards its pilots as “strategic talents (战略人才)”¹⁰ and, in 2017, China Air Force, an official PLA magazine, proclaimed “Without capable people, there is nothing.”¹¹ Against the backdrop of China’s Naval Aviation recruitment campaign in 2019, a popular Chinese military website claimed that “[t]he Chinese military has a tradition of ‘letting people wait for [the more advanced] equipment to arrive, but not the other way around (让人等装备, 不让装备等人),’”¹² which alluded to the importance of ahead-of-schedule training for personnel in the military’s calculation about accelerating the generation of warfighting capabilities. Indeed, the PLA has taken innovative measures to improve the cultivation (培养) of its pilots since at least 2011. As an important measure to acquire better-quality personnel to operate its 4th-generation or even 5th-generation aircraft,ⁱⁱ the military, through MCF measures, has penetrated civilian academic institutions both at the college and at the high school levels to ensure that an effective pipeline for next-generation pilots was created and is sustained for the future.

This report examines the two most notable programs through which the PLAAF and PLAN use MCF to develop their next-generation pilots.ⁱⁱⁱ The first program targets male high school students, aged 14-17, and it is loosely

ii This report uses the U.S. standard characterization of the generations of aircraft, which are different than the Chinese classifications. For instance, when the PLA uses “3rd-generation aircraft,” or “三代机” in Chinese, under the western system, this equates to “4th-generation aircraft.”

iii As of 2019, the PLAAF continues to manage the pilot recruitment of the PLA Army Aviation.

organized under an umbrella structure named Teenagers Aviation Schools (青少年航校).¹³ The second program is labeled as the Dual-Enrollment Program (双学籍/DEP) in its recruitment promotional materials, and it is essentially a program allowing top pilot cadets, i.e. active-duty military personnel, to be simultaneously enrolled in China's most selective civilian universities and military aviation academic institutions. Using primary Chinese language sources, e.g. official PLA publications, social media accounts, and other internet resources, this report seeks to shed light on how the PLAAF and Naval Aviation use MCF to explore talent recruitment, more specifically, how they work with civilian academic institutions, both at the higher-education and high school levels, to experiment with new ways to recruit and train their next-generation pilots. The report first discusses the background and main strategic considerations behind the PLA's overall push to enhance warfighting capability through shortening the talent growth cycle. It then dives into details of the two major programs discussed above. Finally, this report concludes with a basic assessment of the key insights of the PLA's pilot recruitment and training, and provides some preliminary analyses of the implications of the PLA's use of MCF for talent development and what it means for the U.S.-China military competition.

Pilot Training: The Great Leap Forward

The PLA as a whole has been constantly exploring new ways to reduce the time it takes to “generate and enhance warfighting capability (作战能力的生成和提高).”¹⁴ In a 2011 book titled *Transforming How We Generate Warfighting Capability* (战斗力生成模式转变) published by the PLA Military Science Publishing House (军事科学出版社), a PLAAF strategist explicitly called for a paradigm shift from “equipment waiting for people to people waiting for equipment,” highlighting the importance of accelerating personnel training as a key pathway for generating “warfighting capability.”¹⁵ In essence, this PLA jargon means finding ways to educate and train its next-generation of warriors faster so as to ensure their readiness *ahead of* the fielding of its next-generation of equipment. Of particular interest is how this principle has been applied to aviation education and pilot training, particularly for fighter pilots, which is arguably one of the most time-consuming talent training projects. Coincidentally, in July 2011, the PLAAF announced that it had achieved success in using a new program model to train its pilots for 4th-generation aircraft at an unidentified flight academy.^{iv} Through this experimental model, likely started a few years earlier, the first experimental class received their fighter pilot qualifications in 2011,¹⁶ and were to be assigned to operational units to assume combat duties (战斗值班) after flight transition training.

Previously, the PLAAF had been following the Soviet-style, “three-level and five-phase” (三级五段) pilot training model to train its 4th-generation pilots, the entire process, which includes undergraduate education, may last up to ten years.¹⁷

iv This is most likely the PLAAF 5th Flight Academy, because Wang (b:1963), who was introducing the experimental program, was the president of the 5th Flight Academy, later became a deputy commandant of the Xi'an Flight Academy before he left the military and transferred to the civilian sector. Wang is currently the Zhejiang Province Transportation Department's Deputy Director (副厅长). Accessed at: http://zfxgk.zj.gov.cn/xxgk/jcms_files/jcms1/web8/site/art/2014/5/6/art_453_10072.html

The “three levels” include the academic institutions level, the training base level, and the operational unit level; and the “five phases” refer to foundational college coursework, basic trainer training, advanced trainer training, flight transition training, and operational training.¹⁸ However, Wang Yinzong (王寅中), then-Commandant of the PLAAF 5th flight academy,^v stated that the new training model “streamlined the training process, updated the training content, and expanded the operational unit-oriented simulated training, tactics training...[and] helped shorten the pilot growth cycle to seven years.” Besides regular flight instructions, the flight academy also added about ten training items, such as fighter deployment, interceptions, and penetration strike training, all under actual-combat conditions. At the time of graduation, the cadets from this experimental class already mastered fighter aircraft takeoff and landing, [operating] aircraft instrument, aerobatics, formation, and tactics, and they had completed “24-hour rolling schedule (昼夜滚动),” technical training under multiple weather conditions, as well as a portion of technical and tactical flight transition training (技战术改装内容) required by certain units.¹⁹

On the 63rd anniversary of the founding of the PLAAF on 11 November 2012, the PLAAF officially announced that its pilot training model was undergoing a major overhaul so as to better adapt to “joint combat patterns under informatized conditions” (信息化条件下联合作战样式) and the new requirements of “new-type combat aircraft” (新型战机).²⁰ The key change, according to Xie Hong (谢洪), then a deputy director of the PLAAF Headquarters’ Department’s Military Training Department (司令部军训部副部长), would be the gradual elimination of the phase of the “[transition] training base” (训练基地) in pilot training.²¹ Xie also explained that the new pilot education and training would be a “4+1+1” model, which roughly covers a six-year time span comprising:

- o 4 years at AUAF to complete a bachelor’s degree in engineering; 70 hours of basic flight training and “flight screening, selection and adaptive training” (筛选和适应性训练)
- o 1 year at one of the three Flight Academy’s for intermediate flight training
- o 1 year at one of the three Flight Academy’s for advanced flight training and receive another bachelor’s degree in military science).²²

Besides reengineering the processes of flight training, the PLAAF strategists have been keenly aware of the urgency of improving the quality of trainer aircraft

v In August 2011 the PLAAF merged six existing flight academies into the current three Flight Academies – Harbin, Shijiazhuang, and Xi’an Flight Academies.

used at different phases of flight training.²³ “We lack a truly useful advanced training phase (including fighter introduction) due to the constraints of our advanced trainer aircraft capabilities...as the pace of acquisition of the next-generation equipment rapidly accelerates, our flight training mechanism has become the weakest link,”²⁴ they wrote in 2013. The idea of simultaneously fielding new type of combat aircraft to both the operational unit and the flight academies was also suggested, because it helps “ensure that military flight education is consistent with [the need of] the operational units.”²⁵ Based on an assessment of the state of pilot training in 2010, a three-step blueprint was laid out:

“The first step is to transfer J-7s (歼7) and JJ-7s (歼教7) to flight academies, and organize [these academies] into advanced training regiments (高教团) that are responsible for tactics training; The second step is to replace JJ-7s with L-15s (JL-10s), after the latter is in mass production, since L-15s would make the transition to 3rd-gen combat aircraft more smoothly. The third step is assigning J-10s, J-11s, and Su-27s directly to advanced training regiments of the flight academies, which would complete the ‘three aircraft training system (三机训练体制)’ that uses the same type of aircraft at the basic trainer, advanced trainer, and operational unit levels.”²⁶

As of February 2019, it may be estimated that the PLAAF (and Naval Aviation) has taken the second step as L-15s (JL-10s) have been reportedly deployed to advanced training regiments of both the Air Force and the Navy in or around summer of 2018.²⁷ Although details about the use of L-15s remains unclear, the table below shows the training hours associated with each trainer aircraft as of 2013, and it may also provide a baseline for understanding the overall pace of flight training and future directions.

Phase	Flight Theory Education (hrs)	Simulator (hrs)	Actual Flight (hrs)	Length
CJ-6	26	16	80	6 months
JL-8 (K-8)	238	15.3	150	12 months
JJ-7 ^{vi}	237	47	103.5	15 months
Total	501	78.3	333.5	33 months

Table 1: PLAAF Fighter Pilot Cadet Training Overview as of 2013²⁸

vi JL-9 trainer, nicknamed “Mountain Eagle (山鹰),” initially dubbed JJ-7B, was developed to replace the JJ-7s to help train China’s 4th-generation pilots. In October 2015, the PLAAF confirmed that it had been officially used for “3rd-generation aircraft tactics training and basic training need for 4th-generation aircraft.” See: Li Kaiqiang (李开强), “‘Mountain Eagle’ trainer aircraft is fielded at PLAAF academic institutions (‘山鹰’教练机开始在空军院校服役),” *PLA Daily*, Oct 24, 2015, p.4. Accessed at: http://www.81.cn/jfjbmap/content/2015-10/24/content_126981.htm.



Figure 1: Song Lingdong, a Su-35 pilot of a Southern TCAF regiment, seen during an interview video in 2016
 (Source: http://v.cyol.com/content/2016-05/18/content_12599772.htm)

Besides streamlining its overall education and training process, the PLAAF has also put in significant effort to improve its transition flight training at the operational units. Under the new model, after the advanced flight training, the pilots will be assigned to operational units and receive a one-year-long “transition” training, comprising “combat aircraft flight transition” (作战飞机改装) and “combat application training” (作战应用训练).²⁹

For instance, as a test program of the “Air Force military training reform” (空军军事训练改革), the Party Committee of a Harbin Flight Academy (哈尔滨飞行学院) air unit responsible for training H-6 bomber pilots made a major decision in 2014 to introduce active-duty bomber aircraft to its training (现役轰炸机进院校). In an interview with the *China Air Force* magazine, a bi-monthly journal published by the PLAAF’s Political Work Department (formerly known as the Political Department), Harbin Flight Academy leaders noted that “under the old training model, it takes another five to six years for our graduates to become combat ready after they are assigned to an operational unit,” and the new training system makes the transition happen “within one year.”³⁰ Previously, the bomber/transport pilot cadets and all crew members were both trained in HYJ-8 (Y-8), which was essentially a transport airframe with limited modifications. The flight transition training for operating China’s Unmanned Aerial Vehicle (UAV) was also reported to have been significantly shortened through new training methods developed by an experienced PLAAF pilot.³¹ Perhaps most interestingly,

in December 2018, an official PLA source publicized how a Southern Theater Command Air Force (TCAF) air brigade^{vii} had implemented a so-called “actual combat flight transition training” (实战改装训练) for its Su-35 aircraft within one year.³² In another report on the Su-35 conducting day-into-night training in January 2019, the key “ingredients” for the accelerated transition flight training for pilots into the Su-35, according to the official social media account of the PLA Southern Theater Command (TC), was the “fusion” of “technical training, weapons training and the applications of tactics” (技术训练--武器使用--战术应用), and it was noted that this brigade was the first PLA AF brigade to have conducted “combined training with a foreign military outside of China” (走出国门开展中外联合训练).³³

A young Su-35 pilot named Song Lingdong (宋令东), likely in his mid-to-late 20s, was noted to have completed Su-35 flight transition in less than one year, and he was “ready for” joint exercises and joint training. Song told the official Chinese media,

“I belong to the air operations small group (对空作战小组); to be closer to ‘actual combat,’ we have reduced the number of basic [skill] sorties, increased the effectiveness of training, and shortened the entire growth cycle for new pilots (缩短整个作为新飞行员的成长周期).”³⁴



Figure 2: Su-35 simulator
(Source: Official Sina Weibo Account of the China Air Force Magazine)

In an earlier interview with *China Youth Online* in 2016, Song described his personal growth from a high school student who loved watching *Top Gun* and

vii This Su-35 unit most likely changed from a regiment to a brigade sometime in late 2017 or early 2018.

reading *Night Flight*, or *Vol de Nuit*, to becoming a 4th -generation aircraft pilot.³⁵ Based on Song's age, born after 1990, he was younger than 26 years old when he did this interview in May 2016. Song noted that he participated in the PLAAF aviation recruitment and joined AUAF through China's notoriously competitive national college entrance exam, or *Gaokao*, followed by basic training, advanced training, and flight transition training at the operational unit.³⁶

Understanding the PLA's "Great Leap Forward" in next-generation pilot training is important. The following sections focusing on the details of the MCF "joint-cultivation aviation training programs" developed by the PLA since 2011 should be analyzed and understood in this context, because they are essentially expansions of this "Great Leap Forward" in aviation talent acquisition through greater mobilization of Chinese civilian resources under the strategic framework of MCF. The most important objective of these programs, as demonstrated in the following pages, is to achieve "leapfrog" development of its next-generation pilots and ensure that their combat readiness as soon as the next-generation aircraft is delivered.

The Dual-Enrollment Program

Guided by the principle of seeking new pathways to shorten the talent cultivation cycle to generate “warfighting capability” more efficiently, the PLA began to explore pilot education and training through MCF in 2011, and perhaps not surprisingly, it turned to some of China’s most well-known civilian universities to jumpstart this “strategic measure” (战略性举措).³⁷ It was officially known as a program of “military-civilian joint cultivation” (军民联合培养) albeit was more commonly referred to as DEP, or *shuang xueji*, in most of the PLAAF and Naval Aviation official pilot recruitment materials. Initially, the PLAAF worked with Tsinghua University (Tsinghua/清华大学), the most well-regarded Chinese university known for its top-grade science, technology, and engineering programs, in 2011. In 2012, the program developed to include Peking University (PKU/北京大学), and Beijing University of Aeronautics and Astronautics (BUAA/Beihang/北京航空航天大学). DEP follows a “3+1” model. The program is highly-selective, and enrolls a group of high school graduates who specialize in science and engineering subjects (理工科) simultaneously at one of the three elite universities and AUAF. The PLAN officially kicked off its own DEP program in 2013 through forging a similar MCF agreement between Naval Aviation University (海军航空大学) in Yantai, Shandong Province, and the three civilian universities mentioned above.

The Tsinghua Class: “The Rarest of the Rare”³⁸

“For any ambitious young person in China, he probably has one in a million chance to become a pilot, and one in a million chance to become a Tsinghua student; now I want to congratulate you for successfully achieving both ‘one in a million’ at one time!” commented Zhuang Zhuo (庄茁), the Party Committee

Secretary of the School of Aerospace Engineering of Tsinghua, while welcoming the first class of aviation cadets enrolled at Tsinghua in September 2011. The “Tsinghua Class,” nicknamed for the inaugural DEP class, comprised 32 male cadets, who not only achieved top scores in China’s *Gaokao*, but also passed rigorous physical and basic aviation suitability testing and screening, in a five-hour-long evaluation³⁹ using CJ-6s (初教6), organized by the PLAAF.⁴⁰ As one Indian military analyst succinctly observed, DEP Tsinghua is almost “analogous to the USAF joining with MIT or Cal Tech to educate young officers—and potentially, someday, Air Force generals.”⁴¹

Although it is difficult to identify the exact decision maker(s) behind the creation of DEP, it is almost certain that the directives came from the top PLA leadership. On 13 September 2011, General Xu Qiliang (许其亮), member of the CMC, now a CMC Vice Chairman, and then PLAAF Commander, and General Deng Changyou (邓昌友), then PLAAF Political Commissar, paid a special visit to Tsinghua to meet with the first class of the pilot cadets and witnessed the signing of the Tsinghua and PLAAF “Joint Cultivation of Pilot Cadet (联合培养飞行学员)” agreement.⁴² The first Tsinghua class of pilot cadets were “selectively chosen (选拔)” from the incoming class of cadets who had been admitted to the AUAF’s for the 2011 fall class.^{viii} Among the 32 Tsinghua Class cadets, five had won prizes in Science, Technology, Engineering, and Math (STEM) competitions at the national level and 71.9% had won various awards or competitions at the municipality level or above.⁴³



Figure 3: Tsinghua University and the PLAAF signed joint cultivation agreement
 (Source: Guo Haijun, http://www.tsinghua.edu.cn/publish/thunews/10303/2011/20110914113056767266288/20110914113056767266288_.html)

viii For instance, one of the first “Tsinghua Class” cadets, Wang Xiaoyu (王潇雨), acknowledged that he applied to AUAF in 2010–2011 and was later notified that he would instead be joining this experimental joint-cultivation program. See Yang Rong (杨蓉), Liu Kai (刘凯), “Pilot cadets that took off from Tsinghua campus: A Profile of ‘Tsinghua Class’ cadets (起飞于清华园的飞行学子 走近空军首批‘清华班’飞行学员)”, *Air Force News* (空军报), 15 June, 2016, p.3



Figure 4: The “Tsinghua Class” Group Photo taken in front of the Tsinghua University main gate in early September 2011. The photo was reportedly taken by Senior Colonel Shen Jinke (申进科), the current PLAAF Spokesperson. (Source: *PLA Daily*)

DEP students were required to complete the compulsory core courses and aeronautics engineering physics and other specialized courses on astronautics and aeronautics offered by Tsinghua. During the summers, they participated in intensive military training to hone their basic military skills, such as parachuting, shooting, survival in the field, and mobility training. As planned, in July 2014, the first “Tsinghua Class” of pilot cadets was transferred to AUAF to complete their studies in aviation theories and conduct flight training. In June 2015, 28 cadets graduated with dual graduation certificates awarded from both Tsinghua University and AUAF. By June 2016, they had also completed the advanced flight training at Shijiazhuang Flight Academy, where they conducted training with non-DEP pilot cadets. Zhao Jingbo (赵敬波), Chief of Staff of the flight academy, observed that while judged by the same standards, the Tsinghua Class pilot cadets “stood out” and achieved a higher success rate.⁴⁴ Below is a complete timeline of the first DEP at Tsinghua based on available information.

Time	Activities/Achievements
Summer 2011	32 high-school graduates selected by the PLAAF conducted intensive ground training and evaluative primary aircraft flight training (初教机检验飞行训练) at AUAF in Jilin, Changchun.
13 September 2011	32 cadets began their studies at Tsinghua.
Summer 2012 ⁴⁵	32 cadets conducted a 15-day-long intensive field training at the mountainous forest on Changbai Mountain (长白山). Conducted 20 highly-difficult, high-intensity opposition-force training drills and practiced camouflage and disguise, relocation and rescue, mobility training, readiness training, emergency response, tactics drills, and military physical drills.
27 July 2013	Conducted parachute training during the summer at an AUAF flight training base [ground prep 27 days] ⁴⁶
June 2014	Transferred from Tsinghua to AUAF to begin primary aircraft training (初教机); Over a period of six months, took on training subjects including: aviation theories, “experience flying,” parachute training, and firearm training.
March 2015	28 cadets completed their first “solo flights” (单飞) in a basic trainer aircraft (CJ-6) and acquired preliminary independent flying qualification.
June 2015	Graduated from Tsinghua and AUAF.
20 August 2015	26 ^{ix} cadets began their first “solo flights” in advanced trainer aircraft (JL-8/9) at the Shijiazhuang Flight Academy. ⁴⁷
12 October 2015	First “solo flights” in advanced trainer aircraft at the 3 rd air brigade ⁴⁸ at Shijiazhuang Flight Academy.
16 June 2016	The exact number of cadets who successfully completed the advanced flight training may be 24-25. ^x They went on to receive a second bachelor’s degree in military science from Shijiazhuang Flight Academy. Central TCAF Commander Lieutenant General Zhuang Kezhu (庄可柱) participated in their graduation ceremony. ⁴⁹
June 2016	Began flight transition training to become fighter pilots at an operational base.

Table 2: Timeline of Tsinghua Class

According to the PLAAF, DEP is a “major reform” of the PLAAF’s pilot education and training model so as to meet the increasing demand of the PLA’s accelerated military reform and its rapid upgrading of weapons and equipment.⁵⁰ In line with the new thinking about generating warfighting capability through “people waiting for the equipment” discussed in the Introduction of this report, DEP was noted to be a “specific measure” taken by the military to prepare “a backbone force” ahead of the military’s upcoming adoption of its new-generation weapons and equipment. Upon graduation, DEP cadets “will be prioritized

ix A few official sources, including PLAAF Spokesperson Shen Jinke, have said “28 DEP cadets joined the PLAAF combat units in 2016.” the number may include 26 pilots and two officers who changed track at the advanced flight training stage. For two examples, see:

<http://www.bjnews.com.cn/news/2017/11/12/463914.html>; http://news.tsinghua.edu.cn/publish/thunews/10303/2015/20150814111832684666251/20150814111832684666251_.html

x The official Tsinghua University website noted that “approximately 89% of [26] cadets passed the advanced flight training.”

to serve the PLAAF's units equipped with new aircraft (新机型部队); and become candidates for future aviation commanders who would be proficient in commanding joint-operations (指挥联合作战), and conducting flight instructions, as well as promoting theoretical innovations."⁵¹

One key difference between DEP and the USAF Reserve Officer Training Corps (ROTC) flight-related career training is that DEP cadets are simultaneously enrolled at the AUAF, a military academic institution, and a civilian university.⁵² To be qualified as a rated officer, a USAF ROTC student begins taking pilot aptitude tests such as Test of Basic Aviation Skills (TBAS) normally during the spring semester of their junior year,⁵³ DEP, however, is a highly unified top-down arrangement and its students take similar flight aptitude tests before they are even admitted to the program.⁵⁴

Every step taken by the first Tsinghua Class has been observed and studied carefully. In April 2015, CMC Vice Chairman General Xu Qiliang exchanged letters with the students and encouraged them to “further contribute to the modernization of the Air Force.”⁵⁵ While at Tsinghua, they lived in separate quarters and were required to join the National Defense Students (国防生) at Tsinghua to conduct daily physical training. Although they were not required to wear military uniforms while on campus, they followed the military schedule and were required to go to bed at 2330 hours each day. Each week, they were also required to take three two-hour-long physical education (PE) classes.⁵⁶ Guest Lecture series on aeronautics were arranged for the class. Nobel Prize in Physics winner Yang Zhenning (杨振宁) was invited to give a special lecture to the class, China's “Test Flight Hero” Li Zhonghua (李中华) and China's first female air division Commander, Major General Cheng Xiaojian^{xi} (程晓健), also visited the class, and Cheng was nominated to become the “honorary class supervisor” (名誉班主任). The “Tsinghua Class” also interacted with astronauts and visited various PLAAF air units and aircraft factories.⁵⁷ While at AUAF, five members of the class won “innovation awards” (创新奖) and accumulated on average of 82 hours of flying time, and 93% of the class passed the aircraft training, which was cited as the best success rate in the entire PLAAF history.⁵⁸

xi Cheng Xiaojian (b. 1963-64), a special-grade PLAAF pilot, was selected to become one of China's 5th batch female pilots in 1981. In 2009, at the age of 46, Cheng reportedly became the Commander of a transport division under the former Chengdu Military Region, the first female pilot who had assumed this position since the founding of the PRC in 1949. See: “The First PLAAF Female Division Commander Has Been Promoted to Deputy-corps Leader Grade: A Stellar Resume (空军首位女师长已晋升副军级 履历不凡),” 27 June, 2015, *China Military Net*.

Accessed at: http://www.xinhuanet.com//mil/2015-06/27/c_127957180_2.htm

DEP Expansion

Beijing University (PKU) and BUAA joined Tsinghua in 2012 to explore this “joint cultivation” model. In September 2012, 25 students of the first class, mostly from rural China, began their studies at PKU’s Yuanpei College (元培学院).⁵⁹ It was reported that unlike the Tsinghua program, which was established as an independent program from the very beginning, the aviation programs at PKU and BUAA were added to the existing “National Defense Student” program as a new focus. According to Fu Aiguo (傅爱国), PLAAF Political Department Cadre Department Director (空军政治部干部部部长), the PKU and BUAA program would follow the “Dual-degree” (双学士) program, comprising a complete four-year undergraduate study at a civilian university and a two year study, including flight training at AUAF to receive their second undergraduate degree.⁶⁰ The curriculum at PKU would be devised by various foundational science and engineering departments such as math, physics, information science and technology, and college of engineering.⁶¹

However, in reality, after new agreements were signed in 2013, the PKU and BUAA programs were effectively converted into Tsinghua-style DEPs, and the 2012 Class was retroactively adjusted to become the official “first DEP class at PKU and BUAA.”⁶² On 27 September 2017, PLAAF Political Commissar Yu Zhongfu (于忠福), accompanied by the PLAAF Chief of Staff^{xii} Ma Zhenjun (麻振军) and Director of the Political Work Department Du Yuanfang (堵远放) visited DEP students at Tsinghua University and PKU in Beijing.⁶³ According to the PKU official social media account, in 2017,

*“Twenty-five cadets from the 2012 class have already graduated... and eight of them are flying fighters and two helicopter pilots. Sixteen out of the 24 cadets from the 2013 Class passed the primary aircraft training; 21 of the 2014 Class have transferred to AUAF to complete their senior year and basic flight training. Currently, the 2015 Class has 16 cadets, the 2016 Class has 13 cadets, and the 2017 Class has 15.”*⁶⁴

DEP students at PKU’s Yuanpei College are required to major in aeronautics science and technology.⁶⁵ The students are also allowed to select elective courses including math, information technology, and physics. PE classes are compulsory and independent study projects have also been proposed by students. Like the

xii Chief of Staff, or *cannou zhang*/参谋长 in Chinese, is a senior leadership billet under the Commander, or *siling yuan*/司令员, of the PLAAF. This is different from the USAF, whose Chief of Staff serves as the most senior uniformed officer representing the service.

Tsinghua class, extra physical training is required and the students follow the schedule of military academies. Vision and physical tests are also required regularly. Each Sunday night, DEP cadets at PKU also undergo “political study” sessions, which include discussion topics such as “how to better support the Chinese Communist Party [(CCP)] leadership” and “how to defend against thought penetration from the enemy forces” (如何抵御敌方思想渗透).⁶⁶



Figure 5: Yu Zhongfu met with DEP cadets in 2017
(Source: http://junshi.gmw.cn/2017-09/27/content_26360340.htm)

Naval Aviation and DEP

In 2013, the PLAN officially adapted DEP to its selection, education, and training of future pilots for its Naval Aviation branch.⁶⁷ The Naval Aviation DEP is slightly different. It follows a “3+2” training model according to its official pilot recruitment guidelines.⁶⁸ Unlike in the PLA AF, Naval Aviation DEP cadets, upon completing their three-year studies at one of the three selected civilian universities, are required to spend two years at the Naval Aviation University (海军航空大学)^{xiii} before they receive their degrees. In November 2017, it was reported that ten Naval Aviation DEP cadets officially completed their first solo flights in advanced trainer aircraft.⁶⁹ It would be followed by “formation, tactics, and low-altitude aerobatics training.”⁷⁰ See Figure 9 below. Out of the first batch of Naval Aviation DEP cadets, seven were admitted into BUAA while two were assigned

xiii The Naval Aviation University was created in 2017 by combining the former Naval Aviation College (海军航空兵学院) and Naval Aviation Engineering College (海军航空工程学院). For more details, see: http://www.81.cn/jwzl/2017-06/04/content_7748184.htm

The headquarters of the Naval Aviation University is located in Yantai, Shandong province (山东烟台) and it also has a campus and training base in Qingdao, Shandong Province (山东青岛). The university also has a few flight training bases that are located in Hulu Island in Liaoning Province (辽宁葫芦岛), Changzhi, Shanxi Province (山西长治), Qinhuangdao, Hebei Province (河北秦皇岛) and Jiyuan, Henan Province (河南济源).

to PKU and one to Tsinghua. The Naval Aviation recruitment office noted that the civilian institutions are responsible for undergraduate education and the PLAN is in charge of flight training and practice.⁷¹ As of 2016, there had been 41 Naval Aviation DEP cadets that had been admitted into the program.⁷²



Figure 6: Screenshot from CCTV-7, Military Report, Nov 22, 2017, showing Naval Aviation 1st DEP cadet Zhu Jiaqi (Source: https://www.youtube.com/watch?v=DBJCHldz_94)

It appears that the Naval Aviation’s DEP remains much smaller in scale than the PLAAF and details about the programs remain limited. Table 3 shows a brief timeline of the first Naval DEP which started in 2013. Zhu Jiaqi (朱家岐), seen in Figure 6, was admitted to the first Naval Aviation DEP class in 2013, and three years later, he was transferred to the former Naval Aviation Engineering College (海军航空兵学院) in 2016 to kick off his aviation theory learning and basic flight training. By the time he was “ready” for advanced flight training in 2017, the PLAN consolidated the resources of its Naval Aviation College and Aviation Engineering College to create the new Naval Aviation University, and perhaps more importantly, the 4th-generation advanced trainer aircraft JL-10 was commissioned around the same time so that Zhu and his fellow next-generation pilots could be more effectively trained.⁷³

Time	Activities/Achievements
September 2013	10 Naval Aviation cadets were selected to participate in DEP at Tsinghua (1), PKU (2) and BUAA (7).
July 2016	Transferred to Naval Aviation Engineering University to begin primary aircraft training (初教机) at where.
Early December 2016	Completed “solo flights” in basic trainer aircraft training.

June 2017	Began advanced flight training (高教机) [likely in JL-10 that had been commissioned around the same time].
22/23 November 2017	Completed first “solo flights” in advanced trainer aircraft at a PLAN flight training base in northwestern Henan Province. ⁷⁴

Table 3: Timeline of the First Naval Aviation DEP Flight Cadets



Figure 7: DEP cadets studying at PKU library among civilian students
(Source: <http://www.hjzf.mil.cn/news/2019/1/9/40288081669b1a6b01669beb1b7c005d.html>)

Teenagers Aviation School of Air Force (TASAF)⁷⁵ and Naval Teenagers Aviation School (NTAS)

Cultivate New-type Aerospace Talents for the Military, Ahead of schedule

The establishment of DEP appears to have addressed the PLA's urgent need for "better quality" aviation talents suitable for informatized warfare, however, the PLA continued to be concerned about the fact that, as its demand for talented pilots increased, the traditional way of pilot cadet selection out of high school graduates was insufficient to meet those needs.⁷⁶ This is because, according to one Chinese military expert, "they were exposed to aircraft and flying relatively late in life," and "combined with the long training cycle, the optimal combat years [of each pilot] had been significantly shortened."⁷⁷

The main sources of the PLAAF's pilot cadets (飞行学员) are high-school graduates, college students, and college graduates. Since 1999, the PLAAF has begun building partnerships with a number of high schools to form 44 "Early Training Bases" (早期培训基地), through which, more than 2,000 PLAAF pilot cadets were developed. Nevertheless, as the military's requirement for educational levels increased, the PLAAF Aviation Recruitment organs deemed this "Early Training Base" model "outdated."⁷⁸ In 2010, it began building new "experimental" pilot programs in Hebei [Baoding No. 1 Middle School/保定市第一中学] to carry out reforms of the old system. Determined to attract "better quality" junior high school graduates,^{xiv} the PLAAF offered scholarships, tuition reimbursement, and monthly stipends to cover the students' entire high school studies. Upon graduation, they were required to apply to AUAF and would enjoy preference including bonus points during Gaokao. For those who were eliminated from becoming a pilot cadet, they would be offered opportunities to become aviation mechanics (空中机械师) or airborne combat service personnel (空中战勤人员).^{79,xv}

xiv The Chinese junior high schools generally cover 7th-9th grades and high schools cover 10th-12th grades.

xv Although participating in aviation recruitment is mandatory, high-school graduates through such experimental programs were later allowed to apply to other military academic institutions (both



Figure 8: Junior Aviation Military Academy of the Air Force held “1st flight ceremony,” Undated.

(Source: <http://www.chinanews.com/mil/hd2011/2014/12-03/446568.shtml>)

Likely encouraged by the results of the experimental project carried out in Hebei, in 2011, the Air Force moved ahead and created a “Junior Aviation Military Academy of the Air Force” (空军飞行少年军校),⁸⁰ also known as “Air Force Aviation Junior Classes (空军飞行少年班)”⁸¹ at Wuhan No. 6 High School in Hubei Province, Jilin Experimental High School in Jilin Province, and Beizhen High School in Shandong Province.⁸² The “Junior Military Academy of the Air Force” did not have a unified campus, and it was composed of multiple “aviation experimental classes” housed at selected high schools mentioned above. The locations of the schools were determined by the past aviation recruitment record, the provinces that historically produced more pilots were chosen to host the “Academy.” This program was open to male high school students only, and it was not until 2013 when Wuhan No. 6 High School’s aviation experimental class admitted ten female students for the first time.⁸³ Similar to the creation of DEP, the official announcement of the establishment of the Junior Military Academy stated that it was a program jointly run by AUAF and civilian high schools, and it was designed to train “military aviation talents, future Air Force aviation commanders, and backbone force of [China’s] aerospace mission (航空航天事业).”⁸⁴ The “aviation experimental classes,” albeit housed at civilian high schools, were separately managed by the military and a designated high school leadership team.

PLAAF and other services) as well as civilian universities. See: “Teenagers Aviation Schools of the Air Force 2018 Recruitment Begins. Jiangsu plans to recruit 90. Preliminary testing in Yangzhou begins in November (空军青少年航校2018年招生启动啦! 江苏计划招90人, 扬州11起初选检测),” *Yangzhou Broadcast New Media*, April 4, 2018. Accessed at: <http://www.96189.com/2018/0404/233452.shtml>.

They also followed a distinctive curriculum named the *Early Cultivation Course of the Air Force Pilot Talent* (空军飞行人才早期培训教程), which combined civilian high school curriculum and foundational aviation theories.⁸⁵

Besides integrated instruction housed at civilian high schools, the Junior Aviation Military Academy, the predecessor to TASAF, also arranged study tours, military site visits, and most importantly, an opportunity to “experience flying” (体验飞行) with Air Force instructor pilots. For instance, in 2016, a group of 44 students from the 2014 Class of the Junior Aviation Military Academy, renamed TASAF in 2015, were invited to participate in a ten-day-long, “instructor-led experience flying” mini-program at AUAF’s training base.⁸⁶ It was reported that they first spent seven days conducting intensive classroom studies, psychological evaluations, and relevant flight emergency response and simulated flight training, before they were allowed to fly with PLAAF instructor pilots. See Figure 9 and 10 below.



Figure 9: “Flight Kickoff Mobilization Conference” (开飞动员大会) held for the Junior Aviation Military Academy students at AUAF
(Source: http://kj.81.cn/content/2016-09/02/content_7238126.htm)



Figure 10: Junior Aviation Academy students conducting simulated training at AUAF in
(Source: http://kj.81.cn/content/2016-09/02/content_7238126_4.htm)

As stated by the PLAAF, both the Junior Aviation Military Academy and DEP were essentially measures taken to reform and improve its aviation talent education and training; the linkage between the two programs have also been deliberately promoted. It was reported that the 2011 Junior Aviation Class from Wuhan No. 6 High School visited Beijing during their winter break in 2014 and visited the DEP cadets enrolled at Tsinghua and PKU at the time.⁸⁷ In 2014, the first class of graduates from the Junior Aviation Military Academy entered the AUAF, two of which were selected to join DEP at Tsinghua and PKU. By 2017, in the official recruitment advertisement for TASAF, it was also noted that “top graduates from TASAF will be recommended to DEP at Tsinghua, PKU or BUAA.”⁸⁸

Interestingly, in an article tracing the origin of the ideas for establishing a “Junior Aviation Military Academy,” it specifically noted that two PLAAF Commanders, Ma Xiaotian^{xvi} (马晓天) and Xu Qiliang,^{xvii} both became reserve pilot cadets at the age of 16.⁸⁹ The article also noted that since 1955, China established more than 70 aviation clubs to recruit junior high school students aged 14-16 to start an aviation career, and a total of 12,000 pilot cadets were selected and trained through this channel before 1979 and many of them eventually become high-level PLAAF commanding officers and elite pilots.⁹⁰

Name Change and Expansion

In 2015, the Ministry of Education, Ministry of Public Security and the former PLA General Political Department (GPD)⁹¹ jointly approved the establishment of 16 Teenagers Aviation Schools of the Air Force (空军青少年航空学校).⁹² By the end of 2014, the Air Force had already established 11 “aviation experimental classes” under its Junior Aviation Military Academy, totaling 293 students. And out of the 96 graduates of 2014, 39 were selected to join AUAF.



Figure 11 The official logo of TASAF seen presented in a recruitment advertisement of the program at a bus stop, (Source: http://www.sohu.com/a/27051363_229973)

xvi General Ma Xiaotian was replaced by Lieutenant General Ding Laihang in September 2017 as the Commander of the PLAAF. According to Ma's official resume, he was born in August 1949, and he was a student/cadet at the Air Force 2nd Aviation Reserve School (空军第二航空预备学校) in 1965-66. Ma was indeed 16 years old at the time.

xvii According to General Xu Qiliang's official resume, born in March 1950, Xu was a student/cadet of the Air Force 1st Aviation Reserve School (空军第一航空预备学校) in 1966 at the age of 16. See: http://www.xinhuanet.com/politics/leaders/2017-10/25/c_1121856389.htm

The name change appears to have taken into consideration of at least two factors. First, the “experimental classes” under the Junior Aviation Military Academy must have been assessed to be a relatively successful model, and it was assessed to have achieved the internal objectives. To better serve the PLAAF’s increasing need for next-generation pilots who are capable of fighting informatized wars, the expansion of the program would target a larger group of young people and ensure sustainable supply of better-prepared, or “pre-trained”, pilot cadets. Second, changing the name of the program from the Aviation Junior Military Academy to Teenagers Aviation School revealed some deliberate thinking about disguising, or at least de-emphasizing, the military nature of the program. Despite the fact that “Air Force” remains in the full name of the program, the change from “军校” (*jun xiao*/military academy) to “航校” (*hang xiao*/aviation school) effectively shifted the emphasis from “military” to “aviation” in the Chinese-language context. Although graduates from these TASAF classes are required to apply to AUAF, compared with the relative low-profile and small-scale operations of the Junior Aviation Military Academy, the change to TASAF has significantly boosted the program’s “charm offensive.”

The selection process of TASAF mirrors the Air Force Aviation Recruitment (空军招飞), which is mainly composed of three rounds of testing and evaluations, primary selection, secondary selection and final tests. In terms of instruction, TASAF inherited the Junior Aviation Academy’s format, and each student at the experimental class receives 500+ credit hours of aviation course work training during their freshman and sophomore year during winter and summer breaks, including ten days of “experience flying.”⁹³ The selection of host schools was based on provincial administrative departments’ recommendations and verification of Ministry of Education and relevant departments of the Air Force. Each “Experimental Class” was open to current 9th graders of the entire province and between 14-16 years of age. The curriculum followed the compulsory coursework of the national curriculum and coursework devised by the Air Force including national defense education, military physical training, aviation knowledge and flight training. These classes would be managed in accordance with the military battalion and company standards (营连模式), and would be separated from the regular classes at host schools. The students would be required to wear quasi-military uniforms and live on campus. The PLAAF would also assign two to three designated officers to each school to provide management assistance, lead the relevant military education and training programs, and coordinate with the civilian schools. Moreover, the PLAAF also compiled 12 textbooks to be used for

the junior classes and dispatched 56 aviation instructors from AUAF to serve the classes on rotational basis.⁹⁴ Table 4 and Figure 12 below provide an overview of the high schools participating in TASAF.

Participating High Schools	Chinese	Province	Chinese
Shijiazhuang No. 2 High School	石家庄市第二中学	Hebei	河北
Shenyang No. 1 High School	沈阳市第一中学	Liaoning	辽宁
Jilin Experimental High School	吉林省实验中学	Jilin	吉林
Hegang No. 1 High School	鹤岗市第一中学	Heilongjiang	黑龙江
Nantong High School	南通中学	Jiangsu	江苏
The High School attached to Nanjing Normal University	南京师范大学附属中学	Jiangsu	江苏
Shandong Experimental High School	山东省实验中学	Shandong	山东
Shandong Beizhen High School	山东省北镇中学	Shandong	山东
Henan Experimental School	河南省实验中学	Henan	河南
No.1 High School attached to Huazhong Normal University	华中师范大学第一附属中学	Hubei	湖北
Wuhan No. 6 High School	武汉市第六中学	Hubei	湖北
Changsha Zhounan High School	长沙市周南中学	Hunan	湖南
Changde No. 1 High School	常德市第一中学	Hunan	湖南
The High School attached to Sichuan University	四川大学附属中学	Sichuan	四川
Mianyang High School	绵阳中学	Sichuan	四川
Xi'an High School	西安中学	Shaanxi	陕西

Table 4: TASAF Participating High Schools Overview



Figure 12: TASAF Overview
(Source: The PLAAF Recruitment Website)

In 2015, at the onset of the official launch of TASAF, it was reported that more than 110,000 junior high school graduates participated in the recruitment process, and 1,003 students were eventually selected after rounds of rigid testing and screening to be enrolled in the 16 high schools.⁹⁵ The PLAAF offers generous financial support both to the designated high schools and the selected students of the Aviation Experimental Classes. Each student would receive a stipend and meal and clothing allowances, totaling up to 20,000 yuan, approximately \$2,800 USD, annually. Students who excel would also receive extra annual scholarship of 2,000 yuan as a way to encourage the students to “race to the top.” Another category of unspecified financial incentives or direct cash payment was also appropriated by the PLAAF to enhance the physical and mental health of the students, including providing specialty lamps to protect the eyesight and routinized monitoring of the future pilot trainee’s eyesight.

To encourage the schools to provide the best possible educational resources to the TASAF classes, the PLAAF would offer a one-time financial package, known as the “host fee” (开办费), to the schools, and supervise the schools to make required renovations to create “world-class” learning environments, as well as thoroughly implement the “elite education” (精英教育) guidelines including assigning the best teachers of the school to be responsible for the experimental class. These students are also required to apply to PLAAF flight academy’s aviation majors during Gaokao.

In the 2018 Aviation Recruitment cycle, the TASAF recruitment was integrated with other levels of pilot cadet recruitment.⁹⁶ Between 19 March to 29 May 2018, Shijiazhuang, Chengdu, Jinan, Nanjing, Changsha, Shenyang, and Xi’an set up recruitment centers for middle school graduates to participate in exams and tests.



Figure 13: Aviation Experimental Class of Shijiazhuang No. 2 High School
(Source: http://www.81.cn/xwfy/2015-08/31/content_6658483.htm)

Notably, as for the component of “experience flying” serving as a preliminary screening for flight potentials, TASAF in 2017 experimented with working through a civilian flight school, Fu Hang Flight School (福航航院) to provide the training for two 2015 TASAF classes from Shenyang No. 1 High School (沈阳一中) and Hegang High School (鹤岗中学), out of the Faku Flight Training Base (法库飞行训练基地) in Shenyang.⁹⁷ It is not clear, however, if this MCF practice will continue to be used. Because the TASAF “experience flying” was moved back to AUAF in a more unified fashion in 2018, so as to “seamlessly connect [(无缝对接)] the cultivation of military aviation talent at TASAF and AUAF.”⁹⁸ In mid-July 2018, more than 800 students from the 16 TASAF-host high schools gathered at the flight training base of AUAF, and through six primary flight training regiments (初级飞行训练团), the students conducted a two-week-long “military flight experience” (军事飞行体验) program simultaneously.⁹⁹



Figure 14: Experience Flying, TASAF Class of 2015

(Source: <https://www.weibo.com/ttarticle/p/show?id=2309404135907178469080>)

From “Naval Aviation Experimental Class” to Naval Teenagers Aviation School (NTAS)

The PLAN’s effort in establishing its own pipeline for next-generation pilots through MCF started with four “Naval Aviation Experimental Classes” in four provinces in 2015. The Naval Teenagers Aviation School (NTAS/海军青少年航空学校) was not formalized until 2017 when a group of five more high schools were added to the network. NTAS generally kept a relatively low profile and operated at a smaller scale until the official Naval Aviation recruitment website was updated and expanded during the latter part of 2018.¹⁰⁰ To date, the Navy has signed agreements with nine high schools to form its own next-generation pilot reserve base. A plan of opening six more classes was announced in July 2018.¹⁰¹ According to Senior Captain Wu Haitao (吴海涛), a Naval Aviation Recruitment

officer, “after 2019, all of China’s carrier-based pilots would be graduates from these nine^{xviii} NTAS experimental classes.”¹⁰²

Prior to the PLA’s reform in 2016, NTAS program was managed by the former PLAN Political Department (海军政治部), and one of the Deputy Directors of the Department,^{xix} Rear Admiral Xia Ping (夏平), played a visible role in the planning and operations of the NTAS. He was seen visiting multiple high schools, meeting with students, and presided over NTAS program development conferences and seminars.¹⁰³ The format of NTAS is similar to TASAF. Designated “Aviation Experimental Classes” were established within the civilian high schools and the students were offered full scholarships, stipends, and designated uniforms and were supervised by designated teachers separately. Besides regular high school curriculum education, PLAN officers visit the classes regularly and provide special topic instructions; and extra physical education was also embedded in the regular schedule of the schools. Study tours and PLAN site visits are also arranged for the students during the summer.



Figure 15: A group photo taken at the ceremony of the establishment of the 1st NTAS in Southwestern China in Chongqing
(Source: http://fangtan.china.com.cn/2017-01/06/content_40053667.htm)



Figure 16: The official NTAS logo
(Source: Naval Aviation recruitment website)

xviii As of 2019, a total of 14 high schools have become host schools for the NTAS classes. See Table 5.

xix It is now the PLAN Political Work Department (PWD/政治工作部). As of 2019, Xia is reported to be a deputy director of the PLAN Discipline Inspection Committee/Commission (DIC) and he was a deputy director of the PWD.



Figure 17: Navy Political Work Department deputy director Rear Admiral Xia Ping (夏平) visited Henan NTAS and met with Experimental Class students in March 2017
(Source: <http://www.zzn9.com.cn/Item/3729.aspx>)

Host High Schools	Chinese	Province	Chinese
Changle No. 1 Middle School, Shandong	山东省昌乐第一中学	Shandong	山东
No. 9 Middle School, Zhengzhou	郑州市第九中学	Henan	河南
No. 11 Middle School, Chongqing	重庆市第十一中学校	Chongqing	重庆
Huanggang Middle School, Hubei	湖北省黄冈中学	Hubei	湖北
Xiaoshi Middle School, Ningbo	宁波市效实中学	Zhejiang	浙江
Henshui No. 1 Middle School	衡水第一中学	Hebei	河北
Nanchang No. 2 Middle School	南昌市第二中学	Jiangxi	江西
Dalian No. 23 Middle School	大连市第二十三中学	Liaoning	辽宁
Xiangtan County No. 1 Middle School	湘潭县第一中学	Henan	湖南
Heilongjiang Experimental High School	黑龙江省实验中学	Heilongjiang	黑龙江
Hefei No. 10 Senior High School	合肥市第十中学	Anhui	安徽
The Affiliated High School of South China Normal University	华南师范大学附属中学	Guangdong	广东
The High School Affiliated to Shaanxi Normal University	陕西师范大学附属中学	Shaanxi	陕西
Shuangliu Tanghu Middle school	四川省双流棠湖中学	Sichuan	四川

Table 5: NTAS Participating High Schools Overview as of August 2019

It is worth noting that the schools listed above do not overlap with TASAF schools. Whereas the Air Force's effort of exploring multiple programs to build up its pilot reserves began at least in 1999, the Navy's exploration of Teenagers Aviation School and DEP appeared to have largely built on the successes of

Air Force's programs and remain in the “catch-up” phase. It remains unclear if a guiding policy document, similar to the *PLAAF Measures for the Construction and Implementation of TASAF* (空军青少年航空学校建设实施办法), exists. Another notable difference is the “experience flying” component of the Teenagers Aviation Schools: whereas the Air Force has been inviting the high school students to its own training base affiliated with AUAF to fly CJ-6s with PLAAF instructor pilots,^{xx} the Navy instead hired civilian aviation schools to organize the “experience flying” component. It may be speculated that this is because the PLAN does not have enough military trainer aircraft suitable for such large-scale use. But at the same time, it also demonstrates the depth and scope of MCF through which the PLAN seeks to mobilize civilian resources to promote its own cause.



Figure 18: PLAN rented CESSNA-172 from a civilian aviation training company to allow NTAS students to “experience flying” in the summer
(Source: http://www.sohu.com/a/242692540_346466)

In July 2018, the PLAN worked with Hubei Sky-Blue International Aviation School (湖北蔚蓝国际航空学校) and Qingdao Jiutian International Flight Academy (青岛市九天国际飞行学院) and organized more than 200 NTAS students to experience flying at three airfields: Changde, Hunan, Xiangyang, Hubei, and Binzhou, Shandong, concurrently.¹⁰⁴ See Figure 23. It was essentially treated as a scouting event where the PLAN's instructors were observing the performance and made initial assessment of the students' flight suitability and aptitude. The timing and publicity of this event is worth noting, as the Naval Aviation's 2019 recruitment season officially started in September 2018.

^{xx} Except for a small-scale test program in 2017 in which the PLAAF worked with a civilian aviation school discussed earlier.



Figure 19: PLAN Naval Experimental Class 1st Summer Experience, August 2017, Huludao, Shandong
(Source: <http://wemedia.ifeng.com/51568877/wemedia.shtml>)



Figure 20: NTAS students at Chongqing No. 11 High School train with PLAN instructor (重庆十一中海航实验班开展特色拓展训练) 2018-10-21
(Source: <http://hjzf.mil.cn/news/2019/1/24/402880816692a59c016695d5d0330160.html>)



Figure 21: Henan NTAS Holds Open House Day
(Source: <http://hjzf.mil.cn/news/2018/10/3/4028e49865f7d9ab0166156774c902f5.html>)



Figure 22: Dalian No. 23 High School NTAS Experimental Class studies CCP 19th Congress
 (Source: <http://hjzf.mil.cn/news/2019/1/24/402880816692a59c0166958ddbc50127.html>)

Reports about the thought and political education that has been carried out at NTAS, as well as at TASAF, have been scarce. But the weight that has been placed on this type of education during the overall pilot cultivation process should not be underestimated. A fundamental difference between the PLA and the U.S. military is that the former remains a Party-army and it requires its servicemen to put “loving the Chinese Communist Party” equal to, if not ahead of, “loving the country.”¹⁰⁵ The minimum age for joining the CCP is 18 years old,¹⁰⁶ hence most of the high school aviation students are most likely not qualified to join yet. Nevertheless, as shown in Figure 25, the Dalian No. 23 High School political education session on “studying the 19th Party Congress spirit,” led by two instructors, was held at a conference room with its walls filled with posters containing information about CCP Party Constitution (党章) and the CCP Party Oath (入党誓词). Since strengthening party control over the PLA has been given top priority in the era of Xi Jinping’s military reform, it is only logical to assess that one key added value of NTAS and TASAF targeting the formative years of the PLA’s next-generation pilots is that, it provides the military with a unique opportunity to effectively infuse stronger and deeper “faith” of the CCP and the PLA into the future members of the PLA, and ensure these young men growing up are more capable at, to borrow the topic of PKU DEP cadets’ study topic mentioned earlier in this report, “defend[ing] against thought penetration from the enemy forces.”¹⁰⁷

In January 2019, the Chinese media reported that China’s first Navy School (海军中学) [pre-k-12] was to be built in Qingdao, Shandong Province, and the inaugural class would start in September 2019.¹⁰⁸ Considering that Qingdao currently serves as an important Naval hub, the headquarters of the North Sea

Fleet/Northern Theater Command Navy,¹⁰⁹ and China's carrier base, the choice of Qingdao may not be a coincidence. Touted as an example of deepened MCF, the Navy Middle School would be divided into domestic education and international education sections whereas the domestic school would be serving the Qingdao-based PLAN active-duty personnel and families, and the international school section would be open to civilians and foreign expats as a for-profit institution.^{xxi} Although it is unclear if this Middle School would be linked to NTAS, it may prove that the Navy plans to continue exploring yet another MCF pathway to strengthen its next-generation warriors.



Figure 23: Faculty Profiles of the Navy Middle School
(Source: <https://mil.sina.cn/2019-01-17/detail-ihqfscn8056986.d.html>)

xxi The proposed location of this school is: No.111, MCF Demonstration Rd, West Coast District, Qingdao (青岛市西海岸新区军民融合示范区共建路111号).
See: <https://mil.sina.cn/2019-01-17/detail-ihqfscn8056986.d.html>

Drivers and Assessment

The PLA's accelerated acquisition of aviation talents through MCF also warrants concerns and scrutiny from the U.S. military strategists studying the capabilities of the PLA. At the first glance, such programs partially resemble the U.S. military's reserve officer training programs, such as the ROTC or even the Junior Reserve Officer Training Corps (JROTC). But a closer look at the guiding principles and the structures of these PLA-led programs, as described in this report, reveals a number of distinctive "Chinese characteristics." Various "joint-cultivation" programs between the military and civilian institutions studied in this report have been touted as great achievements of MCF; nevertheless, what is concerning to the U.S. military is the fact that the PLA is expanding and deepening its penetration into civilian educational institutions through MCF to acquire more high-quality pilots and other military talents, and more importantly, the intent and calculations behind the expansion of these programs.

The Attrition Rate Revisited

One of the main purposes behind the MCF pilot training programs is to improve the overall quality of the next-generation pilots through cost-effective means, and in a way, to reduce the attrition rate. As of 2016, the PLAAF's attrition rate for aspiring cadets progressing from entering AUAF to assignment to their operational unit had been estimated to be around 50 percent based on a limited number of available official PLA sources.¹¹⁰ Despite being a useful reference for calculating the output of new PLA pilots on an annual basis, details about how the PLA attrition rate is calculated and the criteria used for eliminations need to be further scrutinized to complete this assessment.

Over the past decade, the PLAAF made significant strides in reforming

its pilot cultivation and training. Interestingly, a significant amount of reform measures that have been taken and discussed in this report were originally proposed and discussed in a “forward-looking” (定位超前) study, most likely conducted in 2009–2010, by a group of young and mid-career AUAF instructors and military education experts who were “familiar with the realities of day-to-day aviation talent education and training.”¹¹¹ This study was led by then AUAF President Major General Bai Chongming (白崇明),^{xxii} and the lead author of the final study report, Ji Changguo (籍长国), won a National Best Instructor Award in 2010.¹¹²

The concept of “screening and selection (shai xuan/筛选)”, according to the study, is at the heart of understanding the PLAAF’s attrition rate, and the “screening and selection” of pilots, according to the PLAAF, should be “rigorous, comprehensive, continuous, and complex.”¹¹³ Another important concept is “ending duties involving flight” (ting fei/停飞). Depending on the specific context of usage, it could be applied to both trained pilots, e.g. accomplished pilots who have reached mandatory retirement age, and pilot cadets who have been eliminated from moving onto the next phase of pilot training.¹¹⁴ More specifically, the conditions, or criteria, to be used for “screening and selection” include:

- Political thought/loyalty(政治思想)
- Lifestyle and discipline (作风纪律)
- Flight skill(飞行技术)
- Psychological quality/mental fitness (心理品质)
- Academic performance (科学文化)
- Physical quality (身体素质)

Brief assessments associated with the conditions are also provided by the PLAAF experts. First, the “political loyalty” condition is closely linked to the Party-army nature of the PLA, nonetheless it is noted to be applied to “extreme cases only” and cadets who were eliminated due to this factor would need to be closely monitored. The “discipline” condition is said to have been strictly enforced to eliminate pilot trainees who “disobey rules and regulations” or “seriously disobey disciplinary directives in air operations and endanger flight safety.”¹¹⁵ Second, the discussion about the use of “academic performance” to evaluate the PLA pilot cadets is revealing in the sense that “only a small number of cadets have been eliminated during foundational education phase, and almost no cadet has ever been eliminated at the flight theory study (航理学习) phase.”¹¹⁶ The authors of

xxii Bai Chongming [b.1956] was the AUAF President likely from 2004–2011. For more details, see: <https://baike.baidu.com/item/白崇明>.

the study are keenly aware of the historical inertia of focusing on flight skills at the expense of academic studies, hence they urge the PLAAF to be stricter with enforcing the “academics” criteria so as to encourage the next-generation pilots to devote more energy to learning. Third, the PLA experts noted that “psychological quality” evaluation is an important criterion and has been used to make the eliminations, yet it remains “subjective at times” and more specific standards need to be introduced to improve its effectiveness. Finally, “physical fitness” comprises evaluations of physical health (身体健康状况) and physical traits that are deemed unsuitable for flying (身体条件不适宜飞行). Although details are not provided, the PLA’s physical fitness evaluation is said to be “strict” and have contributed to the number of cadets who had been eliminated in the past.

Generally speaking, to become a combat pilot either in the USAF or in the PLAAF, one has to be both physically and mentally “fit,” and survive the arduous training pipeline. Nevertheless, a closer look at the two practices reveals at least two fundamental differences: First, the USAF pilot training system appears to be constructed to help trainees succeed whereas the PLA’s “screen and select” system stipulates that a certain number of trainees will be “screened out” at different phases. This fundamental difference is mainly rooted in the institutional design of the training mechanisms. For instance, as of 2010, the PLA’s pilot training attrition rate was set to be “no more than 50%” during the primary flight training, and “no higher than 22%” during the advanced trainer phase.¹¹⁷ And there appears to be no PLA equivalent of the USAF’s Commander’s Awareness Program (CAP), a formal process that has been put in place at every phase of flight training to “identify struggling students and prescribe additional help.”¹¹⁸

Second, another important yet overlooked fact about the PLA’s pilot training is the timing of the Chinese equivalent of the U.S. “initial flight training (IFT),” or, a process called “flight screening and election (空中飞行筛选).” In fact, the PLAAF experts specifically note that the main reason why the overall PLAAF pilot training efficiency is much lower than foreign militaries is that the “flight screening” takes place too late in the pilot training process:

“Most foreign militaries implement this ‘rigorous and scientific screening’ prior to the primary flight training as a way to screen-out those who are not suitable for flying; and this effectively decreases the attrition rate during flight training... since the 1990s, the PLA has officially included ‘evaluative flying (检验飞行)’ at the primary flight training phase; although it may be easier to

manage and implement, it has resulted in huge waste in labor, resource, and financial loss.”¹¹⁹

At the time of writing this quoted book in 2009/10, the experts acknowledged the difficulty in including this “evaluative flying” at the aviation recruitment phase due to constraints of the high cost, yet suggested that it should be moved forward to be completed during the “foundational education/undergraduate academic study” phase. That is what exactly the PLAAF did in 2015. AUAF moved the “experiencing flying for screening and selection” (体验筛选飞行) stage from the 4th to the 2nd academic year so that the initial screening of flight potential could be implemented earlier, and more optimized education and training could be allocated. Under the new arrangement, pilot cadets get to “experience flying” in CJ-6s after they complete foundational academic subject study, study basic flight theory, and go through simulated training and ground preparations. Those cadets who are screened out at this phase could choose to leave the “pilot track” and be reassigned to other air service specialties or be transferred to other ground-based military academic institutions.¹²⁰ This also explains why both the PLAAF and PLAN have taken enormous amount of efforts to organize “experience flying” activities through their respective Teenagers Aviation Schools; such activities essentially serve as “evaluative flying” at the pilot recruitment phase, as proposed by the report.

Size Matters

In fall 2018, about 56.6 million students attended elementary and secondary schools in the U.S.¹²¹ whereas the total student enrollment in China is 145 million as of 2017.¹²² Through MCF, the PLA conveniently tapped into China’s relatively large pool of young people to select and train their next-generation of pilots to fly more advanced military aircraft. TASAF has been recruiting around 1,000 students on a yearly basis since it officially started in 2015, based on the official statistics publicized by a number of host high schools in 2018, approximately 50% of the graduates, about 500 students, joined AUAF through this pathway, with another 20-30% of graduates being admitted to other military academies.¹²³ It may take time to fully gauge the effectiveness of these “experimental classes” at the high school level as it is still at an early phase; it may nevertheless be assessed that as time goes by, this effort will likely yield a significant return with better “cultivated” pilots suitable for more accelerated training down their career path. Combined with the PLA’s philosophy of “people waiting for equipment” in its

warfighting capability generation cycle, building an expansive pool of future pilots over time not only affirms the PLA's increasing needs of high-quality pilots, but also suggests possible planning for expanding its warfighting capabilities both in air and possibly even in space, since, as of today, all of Chinese astronauts have been selected from active-duty PLAAF pilots.^{xxiii}

At an operational level, talent acquisition through MCF essentially blurs the line of “the military” and “the civilian” components within the educational institutions, which poses more nuanced challenges for U.S.-China people-to-people exchanges, as some of the U.S. entities engage with Chinese educational institutional institutions assume that they are in contact with civilian students only. For instance, Tsinghua President Qiu Yong (邱勇), Chen Xu's co-equal at Tsinghua, recently met with the visiting MIT Executive Committee, led by MIT President L. Rafael Reif and Chairman of the MIT Corporation Robert B. Millard and exchanged views on their respective recent achievements in “education, research, international cooperation and future development.”¹²⁴ MIT is perhaps not aware, at least at this moment, that its “educational methods” may be applied to the instructions of PLA pilots. It is one thing that graduates from Tsinghua, PKU, and BUAA, join the PLA upon graduation, either voluntarily or through the agreement of the National Defense Student program, it is an entirely different thing that active-duty pilot cadets are directly enrolled in degree programs at civilian institutions through “joint cultivation” arrangements. As Chen Xu (陈旭), Secretary of the Party Committee of Tsinghua University, noted, DEP students are “the first batch of Tsinghua undergraduate students who were both enrolled and graduated as active-duty servicemen (现役身份) since the founding of the PRC.”¹²⁵ Even at the high school level, both TASAF and NTAS's “experimental classes” are housed at civilian high schools and appear to be “civilian” in nature in the sense that the high school students were clearly not active-duty personnel, despite the fact that they are under close monitoring of the military, and are “required to” apply to either AUAF or the Naval Aviation University through Gaokao, which remains the sole pathway to college admission in China.

Also worth noting, is the large number of top high schools that have joined the TASAF and NTAS network, have an “international school” department or branch of sorts, through which many high schools leverage international

xxiii According to official Chinese media, in August 1995, Chinese Manned Space Program Command Department (载人航天工程指挥部) first made the proposal to the CMC to select astronaut trainees from active-duty PLAAF pilots. The CMC approved the proposal in September, and it has become the practice ever since. See: Xi Qixin (奚启新), Fan Juwei (范炬炜), Liu Cheng (刘程), “The Birth of Chinese Astronauts (中国航天员诞生记),” *Xinhua Net*, October 17, 2003.

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educational resources and prepare students for pursuing higher education overseas. For instance, NTAS's Ningbo Xiaoshi High School runs "Ningbo Xiaoshi International Center" and Nanchang No. 2 High School also formed an "International High School" through partnership with Canadian connections. TASAF's Wuhan No. 6 High School is another example, and has a "International Department of Wuhan No.6 High School" whose rather elaborate website openly advertises that the school offers "paramilitary management, AP classes and study tours to the U.S."¹²⁶

The Power of Name-brands

Embedding DEP in the PLA's overall aviation recruitment provided the military with some "name brand" power from partner institutions. Elite universities (and elite high schools in terms of TASAF and NTAS) that have been chosen to "jointly-cultivate" China's next-generation pilots may have a "brand-name effect" that has been deemed valuable for aviation recruitment as well as for the overall PLA conscriptions/recruitment effort writ large. Young Tsinghua graduates flying China's most advanced fighter jets may be the best PR method the PLA has employed to date. Indeed, DEP pilot cadets at Tsinghua and PKU have been seen at the Air Force's Aviation recruitment events as "ambassadors" to share their personal stories with potential candidates. The intensive publicity various Chinese media has given to such programs also suggest that these programs were useful in promoting a more positive and open image of the Air Force and the PLA as a whole, making it more attractive to China's college-educated younger generation. As an increasing amount of China's post-1990 generations become the main force of the PLA, and as more post-2000 generations become the potential recruits, the PLA is in urgent need of an "image makeover."¹²⁷

The recent statistics from aviation recruitment seems to suggest that such "charm offensive" has achieved some initial success. The total recruitment number has been steadily increasing, and in 2017, a total of 130,000 high school graduates participated in the primary pilot cadet selection. After primary and secondary selections, more than 3,600 participated in the final test (定选检测). Out of the 1,600 that passed the final round, 1,110 students (1,075 males and 35 females), whose *Gaokao* score passed the cutoff line for Tier 1 colleges were eventually accepted to become pilot cadets.¹²⁸

Conclusion

At this moment, it may be difficult to fully grasp the quality of the PLA's next-generation pilots created through the reformed pipelines, yet the U.S. and U.S.-ally front-line units who may be interacting with the PLA pilots on a day-to-day basis need to be aware of the existence of such "accelerated pilots" who may have already been deployed to assume active combat duties. The PLA's increasing effort in "shortening the growth cycle of pilots" both through the establishment of MCF programs and accelerated transition flight training on 4th-generation aircraft should be closely monitored. The PLA has been experimenting with different programs to select, train, and educate its pilot cadets, and, as can be seen, the programs studied in this report have gone through a number of adjustments and changes, and the PLA has openly discussed a potential future "seven-year review" process to better manage such programs. More importantly, the driving forces behind such changes also should be closely observed and analyzed, as they may be useful indicators of certain strategic directions of the PLA modernization. In light of the "people waiting for equipment" principle, understanding how China's next-generation pilots are trained may hold the key to our understanding of where China's future aircraft (as well as spacecraft) will be flying in the future.

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