Journal of Aviation/Aerospace Education & Research

Volume 15
Number 1 *JAAER Fall 2005*

Article 4

Fall 2005

In Search of Collegiate Flight "Education"

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FORUM

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INTRODUCTION

"The goal of most college flight programs is not to produce general aviation pilots, but rather professional pilots who also attain AA/BS degree-related life skills," wrote one professor [emphases his]. A central thesis of this paper is that before college flight graduates can compete for "professional" jobs, they will need post-graduation flight experience, i.e., general aviation experience, and to get those general aviation jobs, graduates will also need excellent general aviation skills – which flight collegiate programs commonly do not provide.

The professor's comment is explicitly condescending in its differentiation between general aviation and "professional" flying. This hubris is part of the collegiate aviation problem – training to "professional" standards in general aviation aircraft, and using a college's own graduates to perpetuate a limited, tightly constrained, incestuous training program in general aviation aircraft does not mean that those graduates are exposed to or qualified for the "real world" of general aviation.

Being both an ATP/ CFII and a professor at a flight-oriented university, but teaching in a non-flight department, provided a unique, close up, but outsider's view of collegiate flight "education." Three criteria come to mind for evaluating the efficacy of collegiate flight program philosophies: training, education, and experience. Training means training for flight, both on the ground and in the air; education refers to both traditional academia and also to "flight education," the latter a possibly new concept; and experience means marketable flight experience as opposed to just hours logged. This paper looks at flight "education" and these three standards, based both on lifelong participation in general aviation at multiple levels and also time spent observing a big name flight university.

TRAINING FOR FLIGHT

Medical schools and university flight training programs share the same basic problem -- the objective is to give students an education, but instead, much of the curriculum has to be spent on mere training.[1] In this paper, training means teaching one way of doing things, with justification to support that one way. In contrast to training, a key facet of education is that education prepares the student to evaluate, create, modify, and/or choose a best way of doing things from multiple options.

For general aviation, such education is vitally important as opposed to mere training, because general aviation, especially VFR general aviation where the entry-level jobs are, is substantially more diverse, more complex, more challenging, and more varied in training (in all respects) and in equipment than IFR operations. Indeed, the relative emphasis on IFR and upper end problems in aviation research continues in part because such problems are more readily defined, and success can be declared more readily.

The "emperor's new clothes" of collegiate aviation is this -- airline-centric training by itself is inadequate preparation for successful general aviation employment. Where I taught, airline technique training was procedural, but general aviation-specific training was only palliative. General aviation *education* must include a complete range of knowledge, procedures, techniques, and lore – not to mention the people and teaching skills. And, if training is done to "minimum standards," such as PTS, does that suggest that 100% is the lowest passing grade?

Examples? School-trained, school-employed CFIs have told me that spins tend to go flat if the c.g. is too far forward; that if you lose the engine, your best glide speed does not depend on the wind component; and that if the flaps get stuck full down, the best rate of climb speed is unchanged.

This, in turn, raises the question of where to find appropriate instructors who excel in general aviation -- not professional academicians whose field is general aviation education, but competent individuals truly versed in and exposed to general aviation.

A similar question is what academic background

[1] Dr. Doug Kelly, pilot and retired medical school professor, personal conversation.

such instructors should have. Consider that plumbers, electricians, carpenters, and the like are trained, not educated, by fellow professionals with abundant real world experience. Their hands-on trainers are not required to pretend to pretend to be college professors and do research. Their classroom instructors are not required to pretend to be college professors and have doctorates and do research. Similarly, CFIs are not required to have doctorates and do research. Yet, somewhere arose the bureaucratic idea that genuine academic credentials are required for ground school training.

Equally important is to make sure that the instructors have direct hands-on experience in the depth and breadth of what they teach. For example, ex-military pilots are unlikely to have more than a narrow, passing exposure to general aviation, and are not necessarily qualified for teaching general aviation culture, operations, details, and lore.[2] An ex-military classroom instructor may not have ridden in even a few general aviation aircraft, whereas a well qualified general aviation CFI will have given instruction in at least a dozen makes and models of aircraft. Academic research will not compensate for that lack of experience.

Along those lines, if flight colleges and universities are serious about the quality of the end product, as opposed to maintaining an academic status quo, the quality of hired instructors should be overriding. For example, when I was in high tech, there were any number of very bright people highly knowledgeable in general aviation who would have made excellent classroom or flight instructors. I feel that an instructor rotation program with such people could work well, where those individuals could teach for one or two years before returning to industry, with such individuals motivated in part by the opportunity to audit classes and spend time in jet simulators.

The problem? Multi-fold: accreditation and hiring standards are mismatched to real world needs; academic flight institutions are in denial of entry-level employment requirements; and academic standards for faculty are attuned to perpetuating academic tradition rather than to providing excellence of flight education.

Education – Flight Education

Amazingly enough, in the entire aviation industry, there seems to be little practice of "flight education." Instead, as people progress through their aviation careers, they receive more and more training on aircraft, ATC, weather, human factors, and other topics. Some assimilate this training, reflect upon the differences and similarities amongst the various training received, and meld that totality into perspective and judgment. These multiply trained individuals self-educate, and become able to evaluate, modify, create, and/or choose a best way of doing things from multiple options. Should not aviation universities undertake, as a major responsibility, this kind of flight education?

To upgrade flight training into flight education, a necessary element is teaching multiple techniques for each procedure. The student will then be able to choose a preferred technique, perhaps on the basis of personal preference, for each situation encountered.

Examples of multiple techniques for each procedure could include:

1. For a recovery from a conventional, wings level power on stall, is the nose lowered (a) the minimum amount necessary to bring the wing below the critical angle of attach (b) to the horizon (c) the same amount below the horizon as it was above the horizon? An educated pilot should be able to discuss the pros and cons of each technique. An educated CFI must be able to demonstrate all three.
2. For judging height during the flare, do you (a) look at the far end of the runway (b) move your eyes constantly back and forth from side to side?
3. In the runup area, do you (a) monitor ground control or (b) go to tower frequency as soon as parked in the runup area. What are the pros and cons of each?
4. When ready for takeoff at a towered airport, do you (a) taxi into the number one position and then call in or (b) call in from the runup position before taxiing into the number one position?

Where I was, school-employed CFIs indicated that they had never even heard of alternative techniques. Only one way was taught, and no other ways were even acknowledged.

There are, of course, thousands of examples. An educated pilot must have the ability to consider the pros and cons of each technique seen or discussed, whether that technique is the only technique known to the educated pilot or not. A pilot who has seen only one technique for all or most procedures is like an art student who only knows how to paint by numbers.

A practice lethal to flight education is the practice of many flight schools and FBOs of hiring their own graduates. Certainly there could be a rotation program in place so that new CFI graduates would have a place of employment other than their own alma mater. If accreditation really means anything, a CFI graduate from one accredited institution must be employable at any other

[2] "There is a long standing myth that, because of the very high standard of military aircrew training and operational expertise, GA presents few challenges to the military pilot... do not assume that GA operations are simple, that they are less challenging than military operations..." Dr. Rob Lee, "Military Pilots & General Aviation Aircraft," special edition of Spotlight, published by Defence Publishing Service, RAAF Williams, Laverton, Victoria, Australia, 1999.

accredited institution. Indeed, both accreditation organizations and prospective students should question any flight school whose instructors are predominantly its own graduates.

One of the few examples of "flight education" is the curriculum of test pilot schools. Test pilot students are exposed to a wide variety of criteria, procedures, and techniques in a broad smattering of aircraft so as to be able to evaluate, create, and/or choose a best way of doing things based on that education.

Observe that flight education requires depth and breadth of experience of the instructors. As discussed above, that depth and breadth of general aviation experience is too often absent.

Another aspect of flight education is motivating students to continue and to succeed. I know of no schools whose instructors are taught to be enthusiastic, especially during those parts of the curriculum that are more work and less fun. Bored students bend rules and sometimes airplanes.

Education – College/University Education

At any four year college or university, a Bachelor's degree should mean that a certain amount of education was required for the degree. Many technical degree programs unavoidably contain a certain amount of training, as defined above. For education at a flight college or university, that education must pass the same sanity check as other curricula -- will a graduate of this curricula be educated in fundamentals to a degree that will allow gainful employment in a different, if possibly related, arena?

Core university fundamentals are, of course, inherent in this requirement of transferability. Those fundamental courses should be the same for aviation students as for the general population, and certainly not dumbed down for the pilots. Observe that science, engineering, and liberal arts students are not trained to minimum standards or to "Practical Test Standards."

Experience – Flight Experience

At least three elements are important in flight experience -- total hours, exposure to different aircraft, and exposure to different flight conditions. And. like it or not, the core currency of flight experience is flying time -- not simulators, not equivalents, not stories and excuses, but actual time in the air.

To increase total flight hours, as much training and education as possible must be in the air. A program which uses simulators heavily is a mixed blessing -- there can be savings in time and money, but in many ways, simulator time is not "real" experience, and it is not regarded as "real" flight time by much of the general aviation community. And, unless the cost of the simulator is substantially less than that of the real aircraft per unit of learning, not per hour, the simulator may not be a cost effective way of improving a graduate's marketable experience.

The sanitized environment of a simulator is excellent for mastering techniques to accomplish procedures, but does not provide flight experience. Flight experience has the stresses of turbulence, radio communication, crowded traffic patterns, and the like. A common comment is that the very high fidelity Level 6 simulators are used more than is really justifiable. One way of both increasing flight time and lowering costs is to use less expensive Light Sport Aircraft in training. There are long-term advantages to using a fully instrumented Cessna 172 for initial training, but the expensive airframe and avionics are of little value when learning commercial maneuvers, for example.

A second element of experience is exposure to different aircraft. Useful difference elements include high/low wing, carbureted/fuel injected, nosewheel/tailwheel, stick/wheel, flaps/none, different airfoils and wing loading, and similar. Multiple gains are realized with breadth of experience, including diminished reliance on rote memory to fly the aircraft, and increased adaptability to new aircraft. Such exposure requires little more than a few flight hours per new aircraft type, with emphasis on differences. In addition to regular powered instruction, an educated pilot will have significant exposure to gliders and tailwheel aircraft as well. This kind of experience will be of tremendous benefit in real-world general aviation.

There are multiple advantages to such breadth of experience. One is that it substantially improves the odds for achieving excellence in general aviation, which is or at least should be required for building pre-airline experience. Secondly, this wealth of experience should facilitate future career development, including airline training, as the student will have more background with which to assimilate any future training.

A third element of flight experience is different flight conditions. Indeed, long cross country flights are required in the regulations to make sure that students have such experience. An educated pilot will have more than just the minimum required cross country hours, and not just to airports where the school provides airport diagrams and a "gouge" sheet. Pilots will become educated when they choose their own airports, and review their airport planning with their CFI before undertaking the trip. A student will become educated by taking overnight trips to other kinds of terrain and meteorology, possibly doubling up with another student for such trips. A student will not become any kind of pilot without solo time in the clouds, without time as sole occupant, and without actually making in-flight decisions.

One laudable goal is to reduce flight training costs, and current efforts have succeeded in reducing the cost of getting the required licenses and certificates. It seems to me that along the way, the baby has been thrown out with the

bath water, and that the questionable assumption has been widely bought in to that a graduate trained to minimum FAA test standards is truly educated. The recent article by Arlynn McMahon, "Those who can't, period," in a recent issue of AOPA Flight Training, should be a wake up call to academia and to the industry.

A second laudable goal is risk reduction in flight training. I think that key elements of experience include detecting risk, assessing risk, managing risk, and mitigating risk. When making and acting upon risk-related decisions is removed, experience is replaced with repetition and rote. Which pilot has better experience -- one with 100 hours under the hood and 50 in the simulator, or one with 40 hours under the hood and with 5 hours of genuine risk management solo in the clouds?

Part of risk management from the flight school's point of view should acknowledge adolescent and group psychology. Adolescents, and indeed, adolescents of all ages, want to learn what the limits are, including personal capabilities and equipment limits. This normal pressure can be suppressed by rules and strict supervision, but this does not relieve the underlying drives. For example, CFIs at my school have told me that when students finish their private license and begin commercial and instrument work, the advanced training is perceived as lots more work and lots less fun, and that students feel the need for airborne stress relief. If the school is in denial of the need for such stress relief, the solo student (or sometimes the young instructor) may surreptitiously practice airborne stress relief to the detriment of safety, sometimes resulting in hull losses and/or fatalities.

A second element of risk management has to do with group dynamics. Any group of individuals engaged in a focused task will generate a group identity in speech, mannerisms, attitudes, and dress. That group identity will rarely be in concord with established aviation traditions, where standardization is a major part of many safety concepts. Thus, such group dynamics are also a risk.

SUMMARY

If I were king of a flight training curriculum, I would:

Require students to get a real college education while doing the flight training.

1. Require a CFI exchange with other organizations. Accreditation would depend upon using instructors from other schools.
2. Only hire CFIs who had people skills, teaching skills, and communicable enthusiasm, and that means putting those skills into CFI curricula.
3. Only hire CFIs who had mastered and could demonstrate multiple techniques for procedures.
4. Provide strong mentoring of new CFIs and ground school instructors. Note that none of the letters in "CFI" stand for "pilot."
5. Make sure that classroom instructors had real world experience in the material they were teaching. Military experience, airline experience, and degrees would be accepted for their actual strengths, not as substitutes for general aviation experience.
6. Have students fly aircraft with a variety of handling characteristics and master them, whether they soloed them or not. At least one of those aircraft would be tailwheel or a glider.
7. Require substantial sole occupant flight time.
8. Recognize that experience comes from exposure to possible risk, and manage risk by pre-flight reviews rather than by canned routes and scenarios.
9. Require time in actual IMC for graduation.
10. Require truly long cross countries, requiring multiple refueling stops on trips longer than can be flown in one day, and requiring an overnight stay.
11. Require that faculty evaluation (for promotion and tenure) include recent, relevant real world general aviation flight time. For example, how many FBOs consider the *Collegiate Aviation Review* or the *Journal of Aviation/Aerospace Education and Research* relevant enough to display them on their magazine racks?

Ed Wischmeyer holds ATP/CFII/ME, and a Ph.D. in engineering from MIT with a thesis on general aviation radio navigation. He has over 2700 flight hours in 150 makes and models of general aviation aircraft, 30 years experience in both general aviation and in industry, and is a nationally published aviation journalist. No longer in academia, he lives in Prescott, AZ.