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Educating the Aviation Educator: Opening a New Pathway for Sustaining Industry Development

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Abstract

Aviation education has a well-established history of providing students with the technical skills to meet licensing standards that ensure competency and safety for aircraft operations and maintenance. However, as the industry has evolved, degrees in management and other non-technical aviation degree paths have emerged, which has introduced a broader spectrum of educational pedagogies that emphasize critical thinking, decision-making, interpersonal skills, and other developmental skills into the aviation classroom. The primary industry focus is on creating career pathways for airlines and airports, with a priority on developing career pilots, but little attention is given to flight instruction as a distinct community of professional practice or the skills necessary to deliver excellence. Often seen as a "stepping-stone" as part of a larger career arc, the perspective of flight instruction as a transient role not only risks overlooking teaching as a valid end-stage career pathway, but it also ignores the impact on pilot training that may be realized with a more holistic educative approach. Creating pathways that emphasize professional development for both flight operations and education will enable those passionate about being pilots and teaching to become the next generation of flight instructors with sharpened technical and teaching skills. The Federal Aviation Administration (FAA) regulations for Certified Flight Instructor (CFI) development focus primarily on being able to teach technical flight skills, with limited emphasis on behavioral and interpersonal skills - currently addressed only by a 50-question multiple choice test from an FAA textbook on understanding basic behavioral skills and best teaching practices. Traditionally, flight instructors are trained primarily to meet regulatory requirements, which contributes to training students with a similar perspective, with limited emphasis on the science and art of instruction itself. In the airline training environment, the Advanced Qualification Program (AQP) has fundamentally changed the idea of training in the airline environment and provides a link between higher education and professional development that acknowledges some equivalence of experience (one of the key reasons the R-ATP practice exchanging flight hours for aviation credit hours is accepted). Further acknowledging his, the FAA recently implemented a protocol in 2025 to allow CFIs to teach prospective CFIs with fewer total hours of flight experience in exchange for undertaking coursework in an approved program that focuses on educational practices. Outlined in Advisory 61-145, the Enhanced Flight Instruction Qualification Training Program (EFIQTP) requirements include 25 hours of dedicated ground instruction on how to be an effective instructor.

The pathway to education as a career is easily identified in many other performance- or technical- based fields such as music, engineering, or technology, where students can study an education degree specific to that field. Yet despite the necessity of understanding basic educational principles, prospective students who want to fly actively and contribute to student training lack a specific pathway to aviation education. This study addresses that gap and compares the Federal Aviation Administration education skill development guidance best practices as developed through other fields of practice where education-focused academic curricula have been successfully established.

Introduction

Through the past several decades, studies in educational psychology have found that teaching effectively in STEM courses is more than just having strong knowledge of the content. Although technical experience is essential, the quality of teaching is shaped by the motivation of the instructors and confidence in their teaching abilities to reflect on and adjust their instructional methods [1][2]. Motivated instructors thus feel very confident in their approach and create a learning environment which supports students' understanding and engagement. This suggests that preparation as an educator is by considering the psychological and cognitive processes involved in teaching rather than solely focusing on subject knowledge.

Training pilots to become Certified Flight Instructors (CFIs) is often viewed as an exercise in assuring that they can effectively transfer measurable technical skills rather than as holistic educational development; it is widely accepted in the aviation industry that readiness to teach is primarily based on a pilot's operational experience and having demonstrated theoretical knowledge to a minimum standard. However, this approach overlooks the importance of a CFI to core educational development of students' non-technical skills, including decision making, communication, delegation, and judgment. Considering the term "skill" within the context of aviation education, training, and evaluation has been defined as, "a goal-oriented and efficient execution of a task or behavior that reflects high proficiency and synthesis of information" [3], effective development of pilot skills must be both a training and educational exercise. And yet, in the aviation industry, the focus of CFI training is the development of teaching techniques centered on the transfer of practical skills students need to demonstrate for licensing from a compliance standpoint. Reframing the CFI position as an educational role inclusive of a broader range of skills allows aviation stakeholders to address how CFI training itself should be delivered and the necessary qualifications to instruct with excellence with the same seriousness applied to technical proficiency.

Aspects of Cognition in Teaching

Self-efficacy, the most important concept in educational psychology, involves the teacher's belief in their own ability to affect student learning [4]. Studies have found that instructors with high self-efficacy willingly use active learning strategies, working through instructional challenges and responding productively to the difficulties of students [5]. With complex theory content and applied practical skills in the STEM field, self-efficacy plays an important role in shaping how instructors approach teaching a broad range of skills. Instructors, when they feel confident in their abilities to teach, are better positioned to support students' learning and thus adapt to various challenges of the learning environment.

Another important aspect to an instructor's educational delivery is self-regulation, the ability of educators to plan for and reflect on how they deliver education [6]. Studies in educational psychology describe an effective educator a one who observes instructional practice in addition to modifying it in accordance with the feedback from students and their learning outcomes [7]. Development of an instructor's self-regulatory skills supports instructional quality, thus encouraging their growth professionally as well as meeting minimum standards of instruction.

Motivation of the instructor (beyond the practical delivery requirements of instruction) has also been found to have an impact on the teaching quality. Instructors who consider their personal purpose of teaching, and feel supported in that role, are more likely to put effort into improving their teaching [8].

Educational psychology can thus offer insights into the holistic development of professional identity, in which the success of teaching process can be appreciated beyond subject matter expertise [2]. Incorporating development of self-efficacy, self-regulation, and motivation in stem educators' preparation supports the development of intentional approaches to instructor training.

Historical Background

The general aviation instructor population is comprised primarily of early-career pilots who pursue the CFI certificate and position as an interim step toward eventual airline or corporate employment [9]. Leonard and Christensen found that 75% of instructors intend to leave as soon as they meet restricted airline transport pilot (R-ATP) minimums, suggesting that building of flight hours as a significant motivating force [9]. With this mindset, many CFIs enter instructor roles with relatively little teaching experience and without any expectation of staying in the education business for more than a few years. This transient workforce structure exerts pressure toward prioritizing efficiency and standardization over pedagogical development. While early-career CFIs often bring energy and technical enthusiasm to their teaching, they may have limited skills to diagnose learning difficulties and/or adapt instruction to the needs of an individual student [9]. The system depends on their instructional output despite minimal investment in the development of their skills as educators. This dependence represents a structural mismatch between instructional responsibility and preparation.

Historically, the CFI role has been framed as that of a technical certifier whose main responsibility is ensuring regulatory compliance and practical skills demonstrated to a minimum standard for licensing purposes. Often, the Federal Aviation Administration instructional manuals appear to treat instruction as the transfer of procedures, maneuvers, and checklist discipline [10]. Such thinking is consistent with early aviation training models emphasizing standardization and mechanical reliability [11]. Yet, over time, aviation operations have become increasingly complex, demanding higher-order cognitive skills such as risk assessment and situational awareness [12][13]. Even as aviation operations have evolved, instructor preparation has remained essentially procedural [10]. The professional identity of the CFI has not successfully evolved from that of technicians to that of educator, and as a result, instructional practice has remained underdeveloped.

Moreover, the FAA's Fundamentals of Instruction (FOI) is a recognition of the importance of teaching skills, but it is restrictive in terms of its application and does not reflect contemporary pedagogy in education that is continuously evolving. FOI knowledge assessment skills can be based on the rote knowledge of terms used in education [10]. Prospects may regard FOI preparation as an academic challenge and not as an enabler of better instructional practice. It is important to recognize that the format of FOI assessment may not measure the skills associated with enabling student learning and student motivation as an instructor. FOI knowledge can become unfocused on instructional practice.

In contrast, other technical areas such as nursing, engineering technology, and vocational studies demand formal training as pedagogues prior to entering a teaching capacity [14]-[16]. The afore-mentioned areas understand that not all qualified professionals in their subject area necessarily possess teaching aptitude. The aviation industry differs from these technically oriented industries in that there is no formal educational pathway for aviation educators and educators-to-be in aviation instruction beyond the technical skills required for certification purposes. This paper seeks to understand why this educational imbalance has continued within aviation, in which educational skills are so highly valued to support safe flight operations, as well as all industries and environments affected by aviation transportation.

CFI Certification Requirements and FAA Guidance

For decades, the FAA framework has defined what it means to be qualified to instruct, emphasizing compliance, standardization, and measurable proficiency [10]. The structures have imposed consistency on training environments and have supported a good safety record. At the same time, they reflect assumptions about teaching that may no longer align with the instructional demands put on modern flight instructors, and recent policy updates reflect a growing awareness that instructional competence deserves more attention [17][18]. Currently, CFI certification requirements emphasize aeronautical knowledge, flight proficiency, and regulatory understanding [10][19]. Applicants are required to demonstrate their knowledge of maneuvers, systems, and relevant regulations via written and practical testing. Teaching ability is assessed indirectly via oral examinations and teaching demonstrations during the practical test.
These components do confirm that an applicant can describe concepts and demonstrate correct execution but provide only limited insight into teaching capability or depth of understanding. Additionally, there is very limited formal analysis about how instructors promote learning over time [20]. Consequently, certification primarily serves to verify minimum teaching competence rather than instructional capability.

The FAA Advisory Circular 61-145 [21] has introduced the concept of the Enhanced Flight Instructor Qualification Training Program, which serves as an alternate method for flight instructor qualification. This initiative recognizes that the needs for preparation in instructional areas may not be fully satisfied through certification, and the EFIQTP encourages accredited training entities to develop programs which have the primary objective of providing training for competence [21], including scenario-based training and evaluation. This Advisory Circular brings flexibility and potential guidance on a framework for quality; the purpose of EFIQTP appears to reflect the importance of quality and consistency of instructional delivery and ensure safe learning experiences as an intended outcome. Moreover, the focus of the program on instructional preparation is aimed at overcoming the procedural approach to learning and advancing toward learning-centered approaches [21]. The program promotes the development of instructors in the skills to assess learning and provide instructions and feedback to learners. This approach also promotes a more gradual entry point to instructor preparation as opposed to viewing certification as a discrete event. This is in line with the conceptual framework of the importance of mastering a skill through practice rather than a test [3].

Despite its potential, many issues remain uncertain concerning the depth and pedagogical approach of EFIQTP. This advisory circular specifies considerable latitude with program design, which can create inconsistent training outcomes [21]. There is little specified concerning the volume of educational theory expected to be incorporated into training. Without a framework to assess program quality, there is little way of measuring educational equivalency from program to program. Additional uncertainties remain concerning staffing, student experience, and engagement. This would indicate there is some benefit to a greater alignment between proven educational theory and EFIQTP.

CFI Safety and Risk Management

General aviation accident analysis is consistent in highlighting unique risk factors introduced by instructional environments. Flight instruction puts two pilots of unequal experience into dynamic situations that require constant judgment and supervision. When instructional decision-making breaks down, for example, the consequences often appear to be system-level failures rather than individual flying errors [22]. Framing the educational gap as a risk management issue aligns instructor preparation with aviation's broader safety philosophy: it positions instructional competence as a control measure within the safety system.

Data on accidents in the general aviation environment shows instructional flights as an area with a disproportionate number of accidents under certain circumstances [23]. These accidents commonly happen when an aircraft is taking off or landing as well as when it is practicing specific maneuvers when it is most busy. Though the number of instructional flights is less than solo flights, patterns in instructional accidents have supervisory system flaws. This is the point where the instructional environment adds difficulty over and above control issues related to the aircraft. Instructional accidents become an area worth exploring concerning safety issues related to teaching practice. For example, one of the constant variables observed within the realm of instructional accident analysis involves the wide level of experience and recency on the part of the instructor. It often occurs where CFIs start their instructional career shortly after fulfilling the minimum requirements. They may only teach on a limited basis, and lack of recency within a certain make and model of the aircraft serves as a further contributing or aggravating factor. The instructional staff may very well be current within their legal definition, yet untrained within the more complex decision paths.

Many accident descriptions illustrate instructors who identified potential dangers in time but reacted too late to the situation. In many instances, instructors chose not to act in order not to miss the opportunity to continue training the students. In others, instructors wrongly judged the students' recovery abilities. These do not reflect a concern about practical skills but of instructional competency. It entails the ability to predict errors rather than react to them. This is a function not of mechanics but of education, which is not typically covered in traditional CFI training.

Case studies of accidents demonstrate the impact of points of failure in instructional problem-solving on the results. There are descriptions of instructors whose trainees adopted unsafe attitudes and whose trainees had been exposed to risky new skills. The skills to fly the aircraft technically were often present. The problem arose either as to when to act or how to reduce the complexity. Case studies indicate the problem is not the flight skills but the instructional skills. Data released by the National Transportation Safety Board supports the demarcation between the two different classifications of accidents.

The relationship between instructional supervision, decision-making, and safety outcome, supports the treatment of instructor preparation as a risk management activity. There are a number of instructional accidents that seem to reflect an absence or underperformance of educational skills such as inadequate estimation of readiness or risk communication. As such, increased flight time of an instructor should not be relied on to assess their capability of exercising educational skills. This suggests value to approaching instructor development and supervision from a risk mitigation standpoint, further supporting the case for an educational component of instructor training.

Data Collection and Method

In order to understand the context in which an aviation education pathway could be developed in a university setting, it was necessary to establish common characteristics of existing degree paths where education development is a required component of a technically oriented degree pathway. For the purposes of this study, a technically oriented degree was defined as a degree pathway where the purpose of the degree focuses on the development of an applied skill requiring both learning of foundational principles and directed practice of that skill. To complete a comprehensive review of common approaches to degree design based up field specific technical knowledge and practice, classwork for educational development, and any culminating student teaching or other teaching-oriented demonstration, a survey of large universities were sampled from around the country. School/athletic conference-based organization was used to collect a variety of schools that offer a variety of degree programs. The conferences evaluated in this study were the Big 12, Mountain West, and Southeastern Conference. These conferences include institutions from multiple regions of the United States, allowing the study to examine degree pathway structures across differing educational environments and institutional priorities. They also incorporated schools with many of the highly visible aviation degree programs where lessons learned from within an institution could be applied. The inclusion of schools with strong engineering, education, and applied science programs also provided a meaningful basis for comparison between aviation and other technically focused degree pathways that integrate professional education and student teaching components.

The data from the schools included identifying the degree program, degree type, the number of credits applied for technical knowledge development, the number of credits applied for professional education development, and the number of credits applied for a student teaching demonstration component. General descriptive details were then thematically analyzed and used to establish a base for which an aviation education degree pathway could be similarly developed. Particular attention was given to the sequencing of technical coursework in relation to education coursework, the inclusion of supervised teaching experiences, and the extent to which programs integrated applied practice with instructional development. Programs were also compared based on the presence of capstone experiences, certification or licensure preparation, and opportunities for field-based instruction.

Curriculum Design for Technically Applied Education Programs

There were eight schools within the conferences of the Big 12, Mountain West, and SEC that offer professional pilot aviation degrees. The flight instructor is often a final training component of a university aviation program as it provides a way for students to be able to build flight hours while earning compensation, often with an opportunity to stay at their alma mater to instruct undergraduate professional flight students. Table 1 shows the breakdown of flight instructor education integrated into degrees of the eight aviation programs within these conferences.

Table 1. Flight Instructor Education Development in Aviation Programs

Conference	University	Education Development Courses	Additional Information
Big 12	Kansas State University	Certified Flight Instructor-Aiprlane Ground School (PPIL 210 3 Credits), Certified Flight Instructor-Airplane Ground School (PPPIL 311, 3 credits), Certified Flight Instrucotr Lab (PPIL 314, 2 credits)	2 year AAS option, fight instrutor not required, PPIL 310 and 3110 required for 4 year option but PPIL 311 is option. Ground school courses recommended second semester of 3rd year
Big 12	Arizona State University	Flight Instructor Ground School (AMT 285, 3 credits), Flight instructor Instrument Ground School (AMT 292, 3 credits), Aviation Professional (AMT 396, 1 credit), Flight Operationals and Sfaety VIII (AMT 310, 1 credit)	Flight instructor ground school is recommneded 3rd year (AMT 285 Fall/AMT 292 Spring) while completing commercial pilot certificates. The aviation professional course specifies flight student issues as a component of the course taken second semester 3rd year while the flight instructor flight lab is taken final semester of 4th year.
Big 12	Baylor University	Fundamental of instruction (AVS 3304, 3 credits) Flight Instructor Ground School (AVS 3305, 3 credits), Ceftified Flight Instructor- Airplane Flight (AVS 3236, 2 credit hours), Instructor- Instrument Groudn School (AVS 4306, 3 credit hours) Certifed Flight Isntructor- Instrument Flight (AVS 4237, 2 credits)	AVS 3304, AVS 33055 and AVS 3236 for initial fligth instructor certification are required. Suggested degree map not included but based on course numbers the flight instructor should be completed as one of the last components of the degree. The instrument instructor components are additional electives and not required.
Big 12	Oklahoma State University	Principles of Flight Instruction (AvEd 4133, 3 credits), Flight Instructor Airplane Flight Lab (AvEd 4232, 2 credits)	Ground school component, AvEd 4133 suggested second semester of 3rd year and flight lab taken second semester of 4th year
Mountain West	San Jose State University		No instuctor component suggeste or required
Mountain West	Utah State University	Fundamental of Instruction (AV3700, 1 credit), Certified Flight instructor Ground School (AV3720, 3 credits), Certified Fligth Instructor Certification (AV3740, 2credits)	Fundamental of Instruction course suggested second semester of 3rd year and both the flight instructor ground school and flight component suggested first semester of 4th year
SEC	Auburn University	Principles of Flight Isntruction (AVMF 4280, 3 credits), AVMF 4281 Flight Insruction Training (AVMF 4281, 3 credits), Instrument Flight Instruction Training (AVMF 4351, 2credits), Mulit-Engine Flight Instructor Training (AVM 4371, 2 credits)	No fligth instructor education component suggested or required. Flight instructor components of both ground and flight can be taken as electives, but only initial fligth isntructor incorporates a ground course requirement (AVMF 4280 and AVMF 4281)
SEC	University of Oklahoma	Certified Flight Instrucotr Seminar (AVIA 4113, 3 credits), Flingt Instructor Airplan (AVIA 4602, 2 credits)	Flight instructor component not required or suggested in plan of study but offered as elective.

Notes. *Kansas State University operates their aviation program through its affiliated satellite campus Kansas State University Salina in Salina, KS

As can be seen, the only ground knowledge requirements are a 3 credit hour course on the fundamentals of instruction (FOI), a 60 question Federal Aviation Administration required test for flight instructors on basic instructional principles, and a 3 hour course on flight instructor knowledge principles for skill development. If a flight instructor certificate is required, it is typically a final component before graduation and there is no observation or required instruction of being a flight instructor as a flight instructor during undergraduate studies. In a couple instances the commercial pilot certificate is the final certificate required with the flight instructor component offered as a potential elective if desired (or time available before graduation).

Looking more broadly at applied education tracks, there are degrees that can integrate the education training and the applied skill development into an undergraduate program. Table 2 shows the breakdown of degrees discovered and evaluated within this study meeting the definition of the technically applied and education driven component. The vast majority (93%) of degree level offering within these conferences were agricultural education and music education degrees. The design of these courses also follows a sequence that starts with basic technical knowledge and ends with more advanced applications, as well as instruction.

Table 2. Technical Education Degrees by Conference

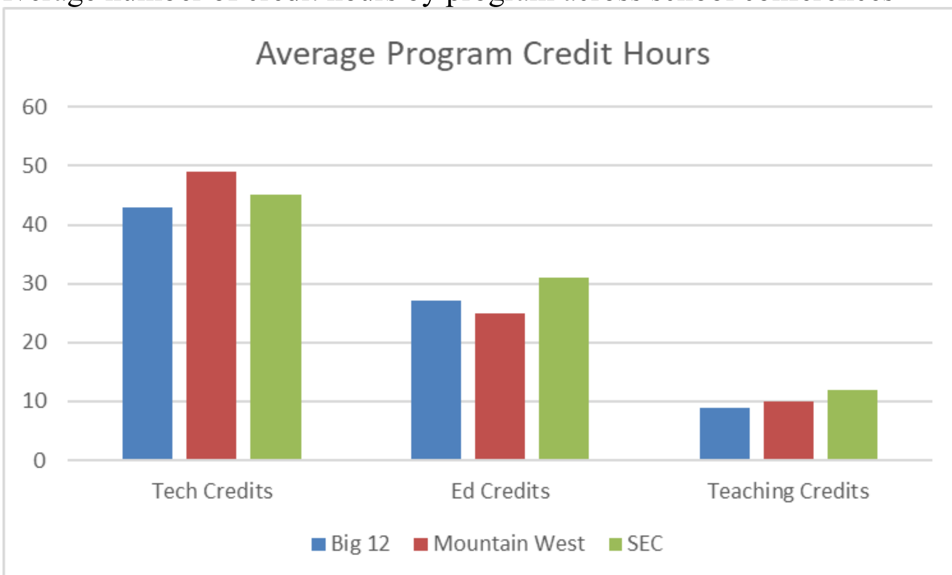
	Big 12	Mountain West	SEC	**Totals**
Agricultural Education	5	7	10	**22**
Music Education	6	7	6	**19**
Technology Education	2			**2**
Consumer Science Ed	1			**1**
Total Schools	14	14	16	**44**

This approach does not occur accidentally; it is in response to accreditation requirements, the needs of the job market, and long-established conventions in technical education. These students will begin with an introduction to basic principles of their respective disciplines, after which they will delve into more specialized courses that combine theory and practical application. Ultimately, they will shift their focus to apply this technical knowledge through teaching and instruction. The process appears to be common among all schools offering such degrees. It can be inferred that the relationship between the two types of knowledge, technical and pedagogical, is an essential part of such degree programs. With regards to aviation education, it may be said that it is subject to the same principles.

Exploring conference based level programs in specific detail across the Big 12, SEC, and Mountain West Conferences, 44 school catalogs were explored to determine specific technically applied education programs. Across these schools, Agriculture Education (22 programs) and Music Education (19 programs) were the predominant education based programs. Figure 1 shows the average number of credit hours per type of credit component (technical development, education development, and student teaching or practicum experience) across the three conferences. Table 3 offers a comparative overview of degree paths for technical education degrees at several schools with applied technical education degree programs within the conferences of the Big 12, Mountain West and SEC. Such universities, which appear to share more similarities with state-focused institutions in the Midwest region than flagship universities, seem to integrate their technical prowess with teaching skills in a methodical and calculated way. Among the degrees discussed here (i.e., Music Education, Agricultural

Education, and Technology Education), there is a clear pattern where the students learn both the skills and how to deliver those skills to others. The rationale behind this approach is the understanding that the students will be able to perform the technical content themselves while also developing the pedagogical knowledge and field-based experience needed to effectively teach content in applied educational settings.

Figure 1. Average number of credit hours by program across school conferences



In typical technically applied program for education development, the largest number of credit hours are focused on the skill based learning, typically an average of 40-50 credit hours in a traditional 120 credit-hour based program. The educational component typically consists of around 20-30 credit hours while the student teaching component is typically around ten total credit hours. Some variations do exist though where some of the largest difference were 60 credit hours of technical skill for music education at the University of Texas while the lowest was 30 credit hours in the Career and Technical Education degree program at the University of Central Florida.

The data further illustrate the need for experiential learning through student teaching or other forms of supervised practical work. The reason this practice is so significant in these fields is that it acts as the final capstone, where the student becomes the practitioner under guidance. In the traditional education domain, this involves undergoing a student teaching assignment over a semester in which the student assumes teaching duties with the support of experienced mentors. This idea finds some form of parallelism in aviation courses, whereby the candidate goes through a systematic process that eventually culminates in flight instructor certification, allowing him/her to teach and improve his/her technical ability at the same time. In most cases, students usually complete all their required training hours before their third year such that by the end of their third year, they are ready for their Certified Flight Instructor (CFI) certification to allow them to start teaching in the fourth year. Educational development credit hours were contrasted a maximum of 45 credit hours at the University of Kansas for an Agricultural Education degree (35 credit hours of technical credit hours) with a minimum of 10 credit hours at the Oklahoma State University in the Music Education program (50 credit hours of technical credit hours). The student teaching components were pretty consistent with the greatest number of credit hours required stretching to 12 (with most schools at the 12-credit hour mark), with the fewest being 5 credit hours.

Table 3. Sample of Technical Education Degree Assessments

Conference	**Institution**	**Degree Program**	**Degree**	**Technical / Applied Credits**	**Professional Education Credits**	**Student Teaching Component**
Big 12	Kansas State University*	Agricultural Education	B.S.	35-40 credits (Animal Science, Crops, Soils, Ag Mechanics)	45 credits (Foundations, Ed Psych, STEM Methods)	12 credits (Full 16-week semester)
Big 12	Arizona State University	Music Learning & Teaching	B.M.	50-60 credits (Studio Lessons, Theory, Ensembles, History)	30-40 credits (Art of Teaching, Music Therapy, Digital Labs)	12-13 credits (Full internship/teaching rotation)
Big 12	Oklahoma State University	Family and Consumer Science Education	B.S.	58 Credits (Desing, Family development, nutrition, textiles)	14 credits (Educational Technology, classroom management, instruction)	6 credits (student teaching or internship)
Mountain West	Boise State University	Agricultural Education	B.S. Ag.Ed.	35-40 credits (Animal Sci, Plant Sci, Welding, Ag Econ)	28-32 credits (Foundations, Literacy, Special Ed)	10 credits (Practicum: Secondary School Teaching)
Mountain West	San Jose State University	Music Education	B.M.	72 units (Music Systems, History, Applied, Ensembles)	~18 units (Foundations of Music Ed, Early Field Experience)	3 credits (Approved Pathway for Single Subject Credential)
Mountain West	Utah State University	Agricultural Education	B.S.	45 credits (Ag Econ, Mechanization, Animal/Plant Sci)	~35 credits (Secondary Teacher Ed Program - STEP)	10 credit (16-week Student Teaching Semester)
SEC	Auburn University	Agriscience Education	B.S.	42 credits (Ag Systems, Animal Sci, Soil Science)	33 credits (Adolescent Dev, Diversity, Methods)	12 credits (Full clinical residency)
SEC	University of Georgia	Agricultural Education	B.S.A.	36 credits (Ag Mechanics, Horticulture, Poultry Sci)	33 credits (Leadership Dev, Community Study)	12 credits (Clinical teaching practicum)
SEC	University of Kentucky	Ag Education & Ext.	B.S.	38 credits (Animal Sci, Ag Econ, Plant/Soil)	30 credits (Instructional Design, Methods)	12 credits (Field experience & internship)

Most education-based programs did require a student teaching experience in a classroom setting, but some programs did offer different opportunities. Field experience was counted as the component at the University of Kentucky and University of Central Florida in the Agricultural Education program (12 credit hours) highlighting a way in which the teaching experience could also be generated outside of a school classroom setting.

Utilizing a Flight Instructor Specialization Pathway

The Federal Aviation Administration requires 60 credit hours of aviation coursework for the Restricted ATP certification for students to go to the airlines after completing their bachelor's degree in aviation. In addition to being 141 certified programs, typical professional pilot degrees in aviation encompass 60 credit hours of required aviation coursework. That coursework usually includes 3-4 certificate, ground knowledge courses and 4-5 pilot courses which is usually a little over 30 credit hours of the 60 required hours. In a typical professional pilot degree though there are usually advanced transport pilot oriented courses that may include advanced turbine knowledge or operations. These 30 credit hours are where a combination of aviation directed education courses coupled with more flight instruction scenario based training could present itself. A flight education specialist, or a student who has a passion to instruct, may not be so worried about the R-ATP certification because the 500 hour difference may be made up fairly quickly as a flight instructor. A flight instructor with a specialization in flight education practices, armed with more background in education practices, may be better able to adapt earlier to wide array of student issues, skill levels, and capabilities. The Fundamentals of Instruction provides a base level knowledge of some of these considerations, but there is very little practice with scenarios and handling concepts until one is actually teaching students in the airplane as a certified flight instructor.

One of the opportunities that stand out during the course of this analysis is the chance to bring about an increased alignment between the current educational system in aviation and the well-known principles of technical education through improvements in the systems of supervision and mentorship. As noted previously, even though some flight training organizations employ full-time instructors, these professionals are not part of any formal supervisory process, much like that seen among student teachers in the traditional sense. The implementation of an increased focus on mentoring, evaluation, and reflection within the context of flight training would certainly improve the quality of the teaching that is taking place, as well as ensure that learning outcomes are improved. In light of new regulatory developments, including those that involve Part 61-145, the role of instructors may be expanded in preparation for instructors who will go on to train other instructors, thus enabling specialist flight instructors to supervise less-experienced instructors, especially those pursuing a professional pilot track and no instructor specialization.

Conclusions

The need for dedicated pedagogical study and understanding of effective teaching methods is not a new concept for aviation flight instruction. With teaching and learning theory already existing as part of the instructor development process, and the inclusion of instructional elements in training and assessment, the FAA and the aviation community already recognize the value of this development. However, there is an opportunity to align the educational development component of instructor training and licensing with other technical disciplines that have more robust and formal education-specific development pathways. Looking to these other disciplines and how technical education programs have developed within them (as opposed to general education programs that offer specialized engagement in different areas), a roadmap for instructor education can be drawn from key common elements:

1. Dedicated subject matter education, sitting mostly in the technical space of that discipline
2. Dedicated development in education theory and best pedagogical practices in consideration of the technical work in that discipline
3. An opportunity, and most cases, a requirement, to practice deploying educational skills and receive critical feedback as part of their training and certification (usually in the form of student teaching)

This framework provides useful guidance as to how a first iteration of a degree program/educational package for flight instructor education might start. Further research is needed to explore exactly which skills, particularly in aviation education, would be the most valuable to flight instruction as well as which approaches to teaching and learning are the most suitable for this environment.

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