

The Use of FAA Flight Training and Aviation Training Devices at UAA Institutions

Steven Goetz, Bryan Harrison, and John Voges
Southern Illinois University Carbondale

Abstract

This study undertook a survey of University Aviation Association (UAA) member institutions to determine the composition of the simulation fleet available to UAA institutions. Additionally, this survey asked about the financial and cultural impacts of the Federal Aviation Administration (FAA) January 2, 2014 policy change that altered the creditable training conducted in Aviation Training Devices (ATDs). The survey found that there is a plethora of training devices in use by UAA member institutions and that 62% of respondents will have to change the way they conduct training, and 48% will spend more than \$20,000 to bring their institutions in compliance with the policy. Furthermore, 66% of respondents expect that their students will be charged an additional \$1000 or more to complete their training because of the policy.

Introduction

Simulation devices called Aviation Training Devices (ATDs) and Flight Training Devices (FTDs) are two types of devices generally used in the flight training industry because they are less costly to own and operate than the higher fidelity full flight simulators used in the airline industry. Aviation Training Devices and FTDs are highly effective training tools for initial flight students that are more interested in learning basic flight and navigation skills as opposed to aircraft type specific skills gained through the use of higher fidelity devices. In January of 2014, the FAA issued a policy change that would change the allowable training credit from ATDs toward private, instrument, and commercial certification (Policy change, 2014). This study sought to identify some of the impacts that these changes could have on collegiate flight training by surveying University Aviation Association (UAA) member institutions regarding their variety of flight simulation equipment, the use of their flight simulation equipment, and the potential financial and curricular impacts of the recent FAA policy change.

Background

A survey of simulation equipment was undertaken in 2002 by Wiggins, Hampton, Morin, Larssen, and Troncoso. Their study had a broader scope than the one undertaken for this study as it was sent to a sample of 14 CFR Part 61 and 14 CFR Part 141 flight schools in addition to UAA member institutions. They found that UAA members had a total of 4 Full Flight simulators (FFS), 261 total FTDs, 133 Personal Computer Aviation Training Devices (PCATD), and 86 other training aids for a grand total of 484 devices.

Wiggins et al. also found that 84% of universities used these devices for training toward an instrument rating, 64% for multi-engine rating, 62% for private certification, and 57% toward commercial certification (Wiggins, Hampton, Morin, Larssen, & Troncoso, 2002). The new simulation policy will limit the creditable training time for any institution using FTDs below level 4 and PCATDs from the Wiggins et al. study (Policy change, 2014). Wiggins et al. did not give data on how many universities had FTDs certified less than level 4, so the full impact cannot be gathered from their study.

Changes to ATD Training Credits

The FAA was able to explain the reasoning behind the initial policy change dated January 2, 2014 in a phone call in April of 2014. During this call, the FAA representative explained that this policy was a result of a Notice of Proposed Rulemaking (NPRM) that was issued in 2009, which had many of the same elements as the current policy change. These included the updating of letters of authorization for aviation training devices as well as the changes to training allotments. These changes were not enforced by the local Flight Standards District Offices (FSDO), and so this policy change was issued to enforce the existing rule. The original rule was proposed and adopted primarily to ensure the quality of the training devices in use. The argument was that if devices were not properly maintained, then they would do more harm than good when training students. The January 2nd policy change presented difficulties for flight training providers because of the seemingly sudden change in training time allotted to ATDs, due to lack of enforcement at the level of the local FSDOs, but in truth, it is an implementation of existing regulation (personal communication with M. Bernard, April 2014).

The January 2, 2014, FAA policy change removed nearly all allowable training in lower level FTDs. Under the policy, level 1, 2, and 3 FTDs are reclassified as ATDs, and thereby subject to the maximum training time allowable in ATDs (Policy change, 2014). Table 1 summarizes how the maximum allowable training times will be changed from before to after the policy change (Certification, 2014; Pilot schools, 2014; Policy change, 2014).

On December 3, 2014, the FAA issued a direct final rule to mitigate some of the impact of the January 2, 2014 policy change by increasing the amount of instrument training credit that a student can receive in Advanced ATDs (AATDs) and Basic ATDs (BATDs) under Part 61 and 141 (Aviation training device, 2014). This increased utilization of ATD's for instrument training would have essentially restored former level 1, 2, and 3 FTD's (if recertified as AATD's) to the original amount of training time as prior to the January 2, 2014 policy change. On January 15, 2015 the FAA withdrew the December 3, 2014 direct final rule due to two negative comments and indicated that, any future necessary changes would be through a notice of proposed rulemaking process (Aviation training device credit for pilot certification; withdrawal, 2015). The changes to creditable training time due to both policy changes can be seen in Table 1 below. The December 3, 2014 direct final rule would not have changed the creditable training time in ATD's for private and commercial training from the January 2014 policy change.

Table 1

Creditable Training Time in Level 1, 2, or 3 FTDs Before Policy Changes, in the January 2014 change, and the December 2014 Direct Final Rule

Training Course	Part 61			Part 141		
	Before policy change	Policy Change (January 2014)	Rescinded Direct Final Rule (December 2014)	Before policy change	Policy Change (January 2014)	Rescinded Direct Final Rule (December 2014)
Private	2.5	0	0	5.25	0	0
Instrument	20	10	20	14	3.5	14
Commercial	50	0	0	24	0	0
Total	72.5	10	20	43.25	3.5	14

Note. Part 141 states maximum FTD time in percentages, which were converted to hours for comparison.

As can be seen in Table 1, Part 61 operators that fail to upgrade their devices will have a reduction in the total creditable time from 72.5 hours to 10 hours by using their former level 1, 2, or 3 FTDs if they are granted AATD status for these devices. For a Part 141 flight school, the time drops from 43.25 hours to 3.5 hours if they continue to utilize devices that were formerly certified as level 1, 2, and 3 FTDs. This is a significant change for both part 61 and 141 flight schools. Due to this large drop in creditable time, the FAA issued a one year grace period for students to complete their current training in level 1, 2, or 3 FTDs. After the end of the grace period, on December 31, 2014, no training time in a low level FTD can be counted as FTD time for certification (Policy change, 2014).

Additionally, all devices which are classified as ATDs must have their letters of authorization (LOA) reissued, including devices previously certified as a level 1-3 FTD. Letters of authorization are normally sought by manufacturers, but many devices have become “orphans” as their manufacturers are no longer in business. This means that the operators must recertify their devices, ensuring they meet the current ATD standards, and apply to the FAA for a new LOA. The new LOAs will have a five year expiration date, causing the operator in this situation to repeat the application process every five years (Policy change, 2014).

Options for Policy Compliance

The January 2nd policy provided three ways to address the change; all three alternatives have curricular as well as financial impacts. The first method is to simply stop using the ATDs and move the training into aircraft. The second is to upgrade the ATDs, where

applicable, and recertify them as level 4, 5, 6, or 7 FTDs and operate them in accordance with FAR Part 60. The final method involves changing the regulations under which flight training is provided (Policy change, 2014). All of these options have advantages and disadvantages, but all options will penalize students in some way.

Moving training into aircraft has the advantage of being readily accessible and a seamless transition for students and flight training providers. An additional advantage is that not all training must be moved into an airplane. If the ATD receives a new LOA, then training is permissible up to the reduced limits as listed in Table 1. For part 61 operators, this means that 2.5 hours of private pilot training, up to 10 hours of instrument training (if only upgraded to BATD), and 50 hours of commercial pilot training would move into an airplane. However the instrument training time is not a 1:1 move, as only about 80 percent of training done in an airplane can be logged as instrument training due to the time spent on the ground taxing and performing the run-up. This means that the 10 hours of instrument training translates to roughly 12.5 hours of airplane flight time. As mentioned previously, the advantage to this approach is the ease of transition as flight training providers will already have aircraft available. The disadvantages though are twofold. The first problem is financial; aircraft cost more to operate than ATDs, so that cost is passed onto the students. The second and more serious concern is the loss of training flexibility for students and instructors. One of the greatest benefits of simulation devices is that they can be used to demonstrate situations that would be impossible or unsafe in an airplane. Examples include inclement weather operations, aircraft system failures, and emergency procedures. By removing training from simulation devices, the FAA is removing a valuable training tool from instructors and taking an important learning opportunity out of many flight training curricula (Ratvasky, Ranaudo, Barnhart, Dickes, & Gingras, 2003).

Upgrading the ATDs, where appropriate, to level 4, 5, 6, or 7 FTDs is the second solution to this FAA policy. This solution has the advantage of leaving simulation training intact in the flight training curriculum, and so some financial and curricular burdens of the first solution are eliminated. For the student, this may be the best solution because it does not necessitate any curricular changes. However, the problem with this solution has to do with the availability and costs of upgrades. Only those ATDs which were manufactured as level 1, 2, or 3 FTDs can be upgraded to higher level FTDs, while not all level 1-3 FTDs will meet modern ATD standards. For those that do qualify, the cost to upgrade a single device is nearly \$40,000, according to one representative of a FTD manufacturer. While this cost would be initially borne by the flight training provider, the students would eventually pay higher fees to cover this cost. Additionally, there is no guarantee that the upgrade will be complete in time for it to benefit the students. The FAA has granted a grandfathering period in their policy that allowed all ATDs to be used as they were currently certified until December 31, 2014. After that date, they must have a new LOA in order to be used. If a device cannot be upgraded before that date, then any training in it will not count toward a certificate or rating, and must be completed again in either an airplane or higher level simulation device (Policy change, 2014).

The third method of addressing the FAA's simulation policy is to change the regulations under which the training is conducted. 14 CFR 141.55(d) and (e) allow for training courses that do not meet the minimum time requirements in the appendices of 14 CFR 141. This would allow a training provider to continue using their ATDs as they are now while neither changing curriculum nor adding a financial burden (Pilot schools, 2014). Not mentioned in the policy change is that flight schools cannot be granted examining authority under 14 CFR 141.55, causing some students to pay increased examination costs. This approach will force the students to use the services of a designated pilot examiner or a representative of the FAA.

Research Questions

This research sought to answer the following three questions:

1. What is the current composition of the simulation fleet available to UAA member institutions?
2. What is the curricular impact on UAA member institutions of the January 2, 2014 FAA policy change regarding creditable ATD time?
3. What is the economic impact on UAA member institutions of the January 2, 2014 FAA policy change regarding creditable ATD time?

Methodology

Participants

To address the research questions, representatives of the 102 UAA member institutions were asked to participate in the study by completing a survey. The individual representatives were selected based on the publically available institutional contact list. The research questions were focused on UAA member institutions, and all 102 were included in the survey request, and so the entire population of interest was surveyed.

Materials/Instruments

A survey was created to determine the types of flight simulation equipment utilized by UAA member institutions and how institutions would be impacted by the January 2, 2014 FAA simulation policy change. The survey was pilot tested for content validity before being submitted to the Human Subjects Committee (HSC), the SIUC institutional review board, for approval. The survey included demographic information about the institution, but no questions were asked about the respondent.

Research Design

This was designed as a descriptive study, in order to obtain information on the current composition of the simulation fleet available to UAA member institutions and the curricular and financial impact of the January 2, 2014 FAA ATD training credit policy

change. After the survey was pilot tested and approved by the HSC, it was sent to UAA member representatives via surveymonkey.com. Surveymonkey.com automatically sent reminder emails twice to those who did not respond, once every ten days after the survey opened. This automation allowed the survey responses to be collected anonymously as the system could keep track of respondents without reporting that information to the researchers.

Results

Response Rate

Of the 102 surveys sent, two were undeliverable. A total of 29 responses were received, but only 27 were usable as two were unanswered, leading to a response rate of 26.4%. While a higher response rate is desirable, it is within the norm for response rates of organizational representatives of 36% +/- 13% established by Baruch (1999).

Institutional Demographic Information

Of the 27 respondents, only one institution used no flight simulation equipment and only used aircraft. All other respondents indicated a use of both simulation and aircraft. Twenty-four (89%) of the responses were from institutions that conferred baccalaureate degrees for their flight training program as compared to three (11%) that conferred associate degrees. Additionally, 24 (89%) respondents indicated they provided flight training under 14 CFR Part 141. Fourteen (54%) respondents indicated that all of their students utilize their institution's simulation equipment, but only ten (38%) respondents indicated that their simulation equipment is used for evaluations and course checks. The relative size of institutions can be seen in Figure 1.

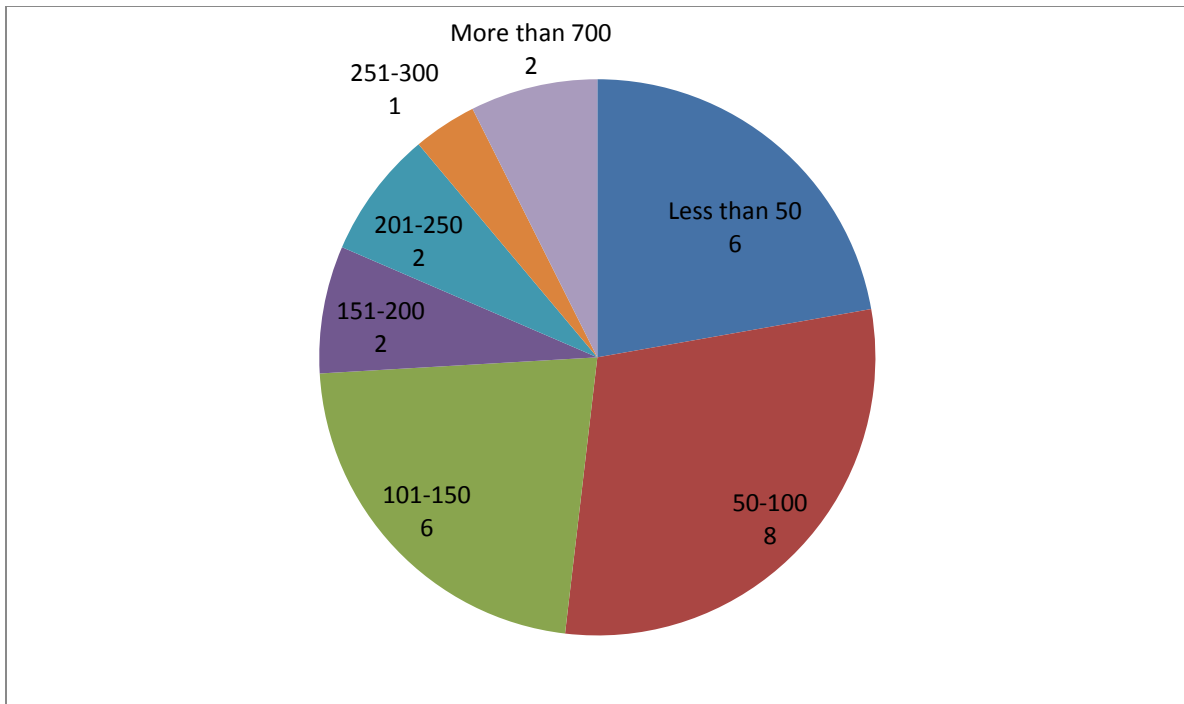


Figure 1. How many total students, on average, are enrolled in your flight training program?

Simulation Equipment

Twenty-two survey respondents listed a total of 78 different device models at varying levels of certification from no certification to level D full flight simulator. Respondents were able to list up to ten device types, though the greatest number of device types listed was seven. The most common manufacturer of devices reported in this survey was Frasca International, Inc., with 46.15%, followed by Redbird Flight Simulations, Inc., with 20.51% of the reported devices. Some institutions had more than one device of the same type. Table 2 lists 111 individual simulation devices listed by respondents. Detailed device make and model information can be found in Appendix A.

Table 2.

Simulation Equipment Device Type by Part 141 Approval Status

Certification Level	Part 141 Approved			Total
	Yes	No	Not Answered	
AATD	18	1		19
BATD	2	9		11
Level 1 FTD	18	1		19
Level 2 FTD	1			1
Level 3 FTD	17	1	2	20
Level 5 FTD	2			2
Level 6 FTD	11		3	14
Level D FFS			1	1
Non-Certified	1	10	2	13
PCATD	11			11
Total	81	22	8	111

Table 3 identifies if the devices utilized a visual display by device type. Respondents indicated that 90% of their devices utilized some form of visual display.

Table 3.

Visual Display by Device Type

Device type	Yes	No	Total
AATD	19		19
BATD	9	2	11
FFS	1		1
Level 1-3 FTD	34	6	40
Level 4-7 FTD	16		16
Non-Certified	10	3	13
PCATD	11		11
Total	100	11	111

Table 4 identifies if devices had motion capability. Respondents indicated that 25 devices (22.5%) had electrically based motion capability, 4 devices (3.6%) had hydraulically based motion capability, and 82 (73.9%) had no motion capability.

Table 4

Motion Capability by Device Type

Device Type	Electrically Based	Hydraulically Based	No	Total
AATD	5		14	19
BATD			11	11
FFS		1		1
Level 1-3 FTD	3	3	34	40
Level 4-7 FTD			16	16
Non-Certified	6		7	13
PCATD	11			11
Total	25	4	82	111

Table 5 indicates flight control loading capability of devices. The respondents indicated that 38 devices (34.2%) had spring control loading, 47 (42.3%) had electronic control loading, 1 (0.9%) had Pneumatic control loading, and 25 (22.5%) had either no loading or were unsure of control loading capability.

Table 5.

Control Loading Capability by Device Type

Device Type	Spring	Electronic	Pneumatic	None	Not Sure	Total
AATD	7	7		4	1	19
BATD	9			2		11
FFS		1				1
Level 1-3 FTD	7	24	1	5	3	40
Level 4-7 FTD		15			1	16
Non-Certified	4			9		13
PCATD	11					11
Total	38	47	1	20	5	111

Table 6 indicates in what training curricula the devices are utilized. The data in this table are different from previous tables because these data are by type of device rather than number of devices. The total number of devices in Table 6 is greater than listed in previous tables because many institutions utilize of type of device in multiple courses of training.

Table 6.

Course of Training by Device Type

Device Type	Private	Instrument	Commercial	Multi-Engine	Other
AATD	9	9	6	5	
BATD	6	1			
Level 1-3 FTD	20	20	15	10	2
Level 4-7 FTD	2	2	3	2	
Level D FFS					
Non-Certified	2	3	2	3	
PCATD	1				
Unknown Type	1	1	1		
Total	41	36	27	20	3

Results of financial and curricular impact survey

Only 21 respondents answered the following survey questions regarding financial and curricular impact of the January 2nd policy change. Survey respondents indicated that 38.1% would not be impacted and 61.9% would be impacted by the FAA's new simulation policy. Of those impacted, 46.15% (28.57% of all respondents) planned to upgrade simulation equipment, and the same number planned to provide more training in aircraft than they had in the past.

Table 7.

Will This Policy Cause Your Institution to Change How Flight Training is Delivered (please select all that apply)?

Answer Choices	Responses
No, my institution will not be affected by this policy.	8 (38%)
Yes, my institution will have to upgrade our simulation equipment in order to meet the policy requirements.	6 (29%)
Yes, my institution will provide less training in simulation equipment and more in aircraft.	6 (29%)
Yes, my institution will change the regulations under which it provides flight training.	0 (0%)
Yes, other.	2 (10%)

When asked how much of a financial burden this policy might represent to their institution, 38.1% reported that there would be no financial burden. The next most common

response was over \$200,000, reported by 19.1% of respondents. Complete results are shown in Figure 2.

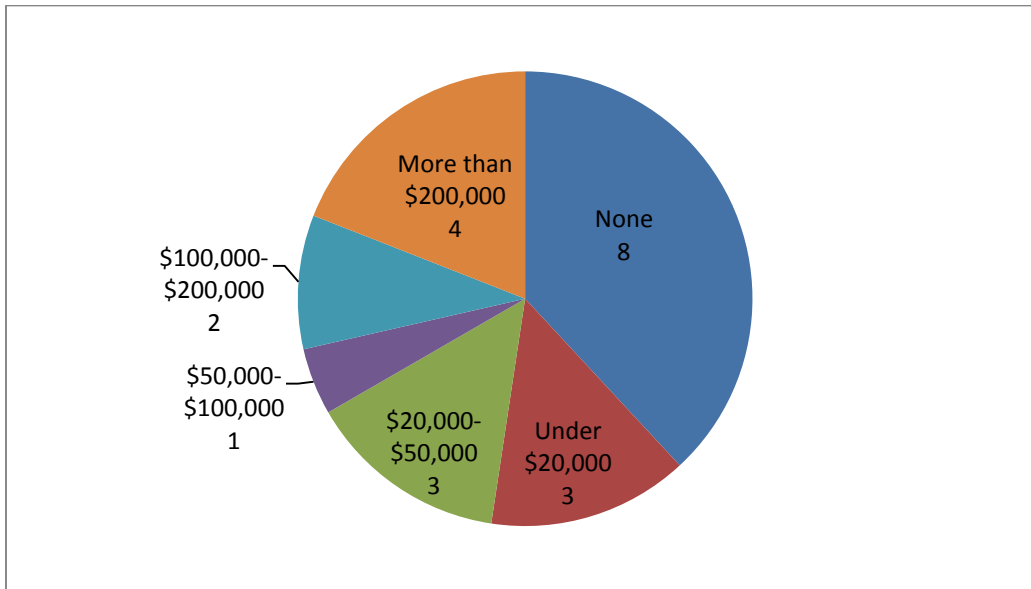


Figure 2. How much of a financial burden might your institution incur to meet the needs of this policy?

When asked the same question with respect to their flight students, only 14.29% of respondents reported that their students would face no financial burden due to this policy. While 71.4% of respondents indicated that the financial burden to their students would be \$4000 or less, 9.52% reported their students will face over \$10,000 in additional financial burden due to the FAA policy change. Complete results to this survey question are shown in Figure 3.

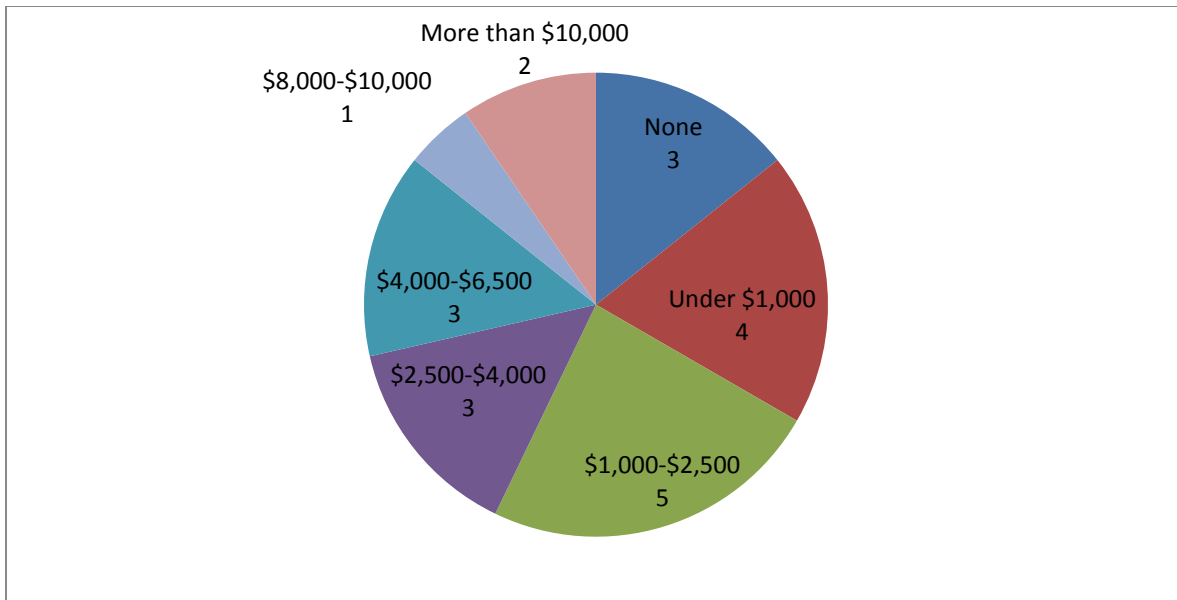


Figure 3. How much of an additional financial burden will this policy's implementation put on your institution's flight students over their course of training?

Limitations

While this study may be valuable to the industry, it is important to note the limitations of the study itself. The first limitation is the issue of response rate. Even though the response rate was within the norms established in the literature, it was on the lower end of those norms. This study, and any conclusions applicable to the industry, could be greatly enhanced by a higher response rate. The second limitation comes from the lack of respondent demographics. While the survey was sent to the UAA designated institutional representative, there is no guarantee that person is the one who completed the survey and also no guarantee that person would be the appropriate person to complete the survey. No information was requested in order to further guarantee anonymity of the respondents and their institutions.

Conclusions

According to the survey respondents, 81 of the 111 device models (73%) are affected by the new FAA policy. Of those, only 40 have the potential to be upgraded to level 4-7 FTDs; it is likely that not all of them will be eligible for upgrade. Each flight school utilizing lower level FTD's will have to evaluate the costs and benefits from both financial and curricular perspectives to determine the best course of action for their programs and students, whether it be moving training to aircraft, upgrading equipment, utilizing 14 CFR 141.55, or seeking ATD status for their current equipment. No matter what flight schools choose to do, those that provide training in low level FTDs will need to make changes to remain in compliance with the regulations.

Nearly half (48%) of survey respondents expected their institutions to incur \$20,000 or more in costs due to the January policy change. Fourteen respondents (67%) expected students to incur \$1,000 or more in flight training costs. Though the December 3 direct final rule was an attempt by the FAA to mitigate the effects of the January 2 policy change, it still did not allow for any use of an ATD in private and commercial training. As with many recent regulatory changes, the costs of flight training are likely to increase for students. As noted in the results, eight respondents indicated that their institution wouldn't incur any costs due to the January 2nd policy change, while only three indicated that students wouldn't incur any additional costs.

Implications

These results indicate how much of an impact the policy change may have on the flight training industry. Bjerke and Malott (2011) found that cost was a major factor in whether students continued to pursue an aviation career. Though some of the costs of the January 2nd policy change could have been mitigated by the December 3rd ATD direct final rule, the direct final rule was rescinded. Either way, an increased financial burden placed on students will likely drive some students away from being the next generation of pilots.

Recommendations

The direct final rule issued on December 3, 2014 by the FAA would have gone a long way to reduce the financial and curricular burden on instrument training. It still didn't address the point that if ATD's are good enough for instrument training why their use can't be increased for private and commercial training. The intent of the FAA policy is to ensure the quality of training being given using ATDs. There are several actions which could both allow the FAA to ensure the quality of training as well as providing the flight training community time to respond to the changes in the least impactful way possible. These include:

1. Conduct a notice for proposed rulemaking to allow greater use of ATDs in pilot training.

A formal NPRM process would allow for a fair and open discussion about the benefits and drawbacks of the use of ATDs in flight training. This discussion between the FAA, the flight training industry, and ATD manufacturers is needed to shape the landscape of flight training using training devices. Until such a discussion happens the flight training industry will be left wondering why a device which in 2013 was sufficient for one level of training is in 2015 sufficient for a reduced level of training.

2. Permitting ATDs to be used for private and commercial training.

This suggestion has the benefit of simplicity for training providers as it would allow the same training credit as before the January 2014 policy change. By maintaining the expiration of the LOA, this suggestion also allows for better control of the quality of ATD being utilized by training providers. This suggestion, however, may place a burden on manufacturers of higher level FTDs as there would be little to no training benefit from the higher level devices.

3. Conducting a study of the training differences and effectiveness of ATDs and higher level FTDs.

If ATDs can be shown to be as effective at providing training as higher level FTDs, then an argument can be made to restore the training time that was removed from them. If they cannot be shown as effective as higher level FTDs, then perhaps an argument could be made to allow more training credit for higher level FTDs.

These recommendations may not fully rectify the impacts that the policy change may have on the flight training community, but they will allow the FAA to ensure the quality of the ATD training fleet through a renewal of the LOA process, and also give the flight training community time to better study the impact of these changes on the flight training industry.

References

- Aviation training device credit for pilot certification. (2014). Federal Docket no. FAA-2014-0987-0001. Retrieved from <http://www.regulations.gov/#!documentDetail;D=FAA-2014-0987-0001>
- Aviation training device credit for pilot certification; withdrawal. (2015). Federal Docket no. FAA-2014-0987-0024. Retrieved from <http://www.regulations.gov/#!documentDetail;D=FAA-2014-0987-0024>
- Baruch, Y. (1999). Response rate in academic studies: A comparative analysis. *Human Relations*, 52(4), pp. 421-438. doi: 10.1177/001872679905200401
- Bjerke, E. & Malott, D. (2011). Impacts of public law 111-216: Will the flight instructor career path remain a viable option for aspiring airline pilots? *Collegiate Aviation Review*, 29(1), 1-9. Retrieved from: <http://www.imis100us1.com/uua/AsiCommon/Controls/BSA/downloader.aspx?iUniformKey=d6a1e4c9-9846-4f72-9610-4eb9a50a03c4&iFileTypeCode=PDF>
- Certification: Pilots, flight instructors, and ground instructors. (2014). Title 14 C.F.R. pt. 61. Retrieved from [http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=40760189a03dfea0b501608f33820a45&rgn=div5&view=text&nnode=14:2.0.1.1.2&idno=14](http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=40760189a03dfea0b501608f33820a45&rgn=div5&view=text&node=14:2.0.1.1.2&idno=14)
- Pilot schools. (2014). Title 14 C.F.R. pt. 141. Retrieved from <http://www.ecfr.gov/cgi-bin/text-idx?SID=d97936cb7a135c8eb7b0c157f5b84c7d&node=14:3.0.1.2.16&rgn=div5>
- Policy change: Use of approved training devices. (2014). Federal Docket no. FAA-2013-0809-0001. Retrieved from <https://www.federalregister.gov/articles/2014/01/02/2013-31094/notice-of-policy-change-for-the-use-of-faa-approved-training-devices>
- Ratvasky, T. P., Ranaudo, R. J., Barnhart, B. P., Dickes, E. G., & Gingras, D. R. (2003). *Development and utility of a piloted flight simulator for icing effects training* (NASA Technical Report Number: NASA/TM—2003-212166). Retrieved from <http://gltrs.grc.nasa.gov/reports/2003/TM-2003-212166.pdf>
- Wiggins, M. E., Hampton, S., Morin, D., Larssen, A., & Troncoso, A. (2002). A study of training devices used by flight training organizations. Report prepared for the University Aviation Association under FAA contract No. DTFA 01-01-X-02051. Daytona Beach, FL: Embry-Riddle Aeronautical University. Retrieved from <https://www.hf.faa.gov/docs/508/docs/FTDphaseI.pdf>

Appendix A. Simulation Devices Results by Make and Model

Make and Model	Certification Level	Part 141 approved			Total
		Yes	No	Not Answered	
ATC 710	BATD	2			2
Frasca 141/142	BATD		3		3
	Level 1 FTD	12			12
	Level 3 FTD	6			6
	Non-Certified		2		2
Frasca 141/142 Total		18	5		23
Frasca 241/242	BATD		3		3
	Level 1 FTD	4			4
	Level 3 FTD	4			4
	Non-Certified		1		1
Frasca 241/242 Total		8	4		12
Frasca Other (please specify)	AATD	4			4
	Level 1 FTD	1	1		2
	Level 3 FTD	2	1	2	5
	Level 5 FTD	2			2
	Level 6 FTD	10		3	13
Frasca Other (please specify) Total		19	2	5	26
GAT -1	Non-Certified		1		1
GAT -2	Level 2 FTD	1			1
Other (please specify)	AATD	4	1		5
	Level 3 FTD	3			3
	Level 6 FTD	1			1
	Level D FFS			1	1
	Non-Certified		2		2
	PCATD	11			11
Other (please specify) Total		19	3	1	23
Precision Flight Controls MFD	AATD	3			3
Redbird FMX	AATD	5			5
	Level 3 FTD	1			1
Redbird FMX Total		6			6
Redbird Jay	Non-Certified	1	1		2
Redbird MCX	AATD	1			1
	Level 1 FTD	1			1
Redbird MCX Total		2			2
Redbird SD	AATD	1			1
	Level 3 FTD	1			1
Redbird SD Total		2			2
Redbird TD	BATD		2		2
Redbird TD2	BATD		1		1
Redbird Xwind	Non-Certified		1	2	3
Redbird Xwind SE	Non-Certified		2		2
Grand Total		81	22	8	111