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Maxine Lubner

Andrew R. Dattel

Emerson Allen

Deb Henneberry

Sharon DeVivo

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**Six-Year Follow-Up of Intensive, Simulator-Based Pilot Training**  
**Paper to be presented at the 20th International Symposium on Aviation Psychology**  
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**Maxine Lubner, Ph.D.**  
**Vaughn College of Aeronautics and Technology, New York, NY**  
**Andrew R. Dattel, Ph.D.**  
**Embry-Riddle Aeronautical University, Florida**  
**Emerson Allen, B.S.**  
**Vaughn College of Aeronautics and Technology, New York**  
**Deb Henneberry, Ed.D.**  
**Vaughn College of Aeronautics and Technology, New York, NY**  
**Sharon DeVivo, Ed.D.**  
**Vaughn College of Aeronautics and Technology, New York, NY**

In 2012, Vaughn College of Aeronautics and Technology initiated an intensive, simulator based, flight training program. Three cohorts, totaling 16 students, completed flight training with fewer flight hours than the United States average (ISAP, 2013). The students earned Federal Aviation Administration (FAA) Private Pilot certificates within 5 weeks, Instrument ratings in 3-4 weeks, Commercial certificates in an average of 20 weeks and Certificated Flight Instructor ratings in an average of 40 weeks. All participants met selection criteria, including completing their FAA Class III medical certificates, FAA Private Pilot Knowledge exams, a demonstration flight, financial counseling, having a grade point average of at least 3.0, and agreeing to remain substance-free during training. These 16 students and a comparison group of students who enrolled in traditional flight training at the college at that time have been followed over the past 6 years to observe factors associated with their career progression. Surveys were conducted by e-mail, phone, or in person to ask about flight training, career progression, and experiences of camaraderie, mentorship, and general satisfaction with their programs. This follow-up study found that 13 of the 16 students (81%) achieved their career goals of flying professionally. The comparison group has taken longer to complete flight training and proportionally fewer are flying professionally. Indicators of success in achieving professional pilot careers and networks included the cognitive variables related to intensive simulator-based training, camaraderie, shared learning experiences and opportunities to reflect on training.

Simulator based training (SBT) for pilots is accepted as essential and successful for training of pilots, particularly those operating advanced equipment and even for training of ab initio airline pilots in multi-crew, complex environments, even though the methods and times to completion may vary (McLean, Lambeth, Mavin, 2016). In the US, pilots usually obtain training on their own as they must have an FAA - issued commercial certificate to be paid to fly, and an airline transport certificate (ATP) to fly for the airlines. Airline pilots must hold a bachelor's degree. Pilots must accrue thousands of hours before they are hired by the airlines (BLS.gov, 2019). These requirements make it vital to obtain FAA qualifications quickly and collegiate flight training attractive, albeit expensive. However, SBT for beginner pilots is not often used because evidence of its effectiveness is not clear (Goetz, Harrison, Voges, 2015) and because the FAA only allows a limited amount of simulator to be entered in pilots' log books (14 CFR Part 61 or Part 141).

Advantages of SBT include financial ones because simulator equipment with moderate fidelity can be effective; transportation, scheduling and flight conditions such as poor weather do not impede training sessions; and dangerous or unusual maneuvers can be taught safely (Goetz et al., 2015; Harris, 2011; Salas, Bowers, & Rhodenizer, 1998; Taylor et al., 1999).

How to use SBT for flight training and understanding the learning processes have been productively examined. For example, scenarios that freeze a situation for detailed examination can only be created in a simulator. Simulator training can easily address a variety of styles of learning, such as conceptual, procedural, scenario, collaborative and individual styles of training (Dattel, et al., 2009, Dattel, Kossuth, Sheehan, & Green, 2013). However, the duration of simulator centric learning is hard to assess because of the usual difficulties of longitudinal studies, such the logistics and expenses of tracking pilots over time. Besides SBT, it is possible that accelerated flight training programs confer their own advantages, such as the intensity of training and support offered by a group of students in the same situation (Lubner, Dattel, Henneberry, & DeVivo 2105; 2017). In this cohort study, the duration of positive gains from an intensive, SBT flight training program is explored.

### **Method and Program Description**

A descriptive examination of the effectiveness of a simulator-based training program for pilots was conducted. Of 55 students of varying backgrounds, but mostly with limited flight experience, sixteen enrolled in an intensive, simulator-based flight training program in January 2012. Within two years the remainder had enrolled in conventional collegiate flight training, supplemented with some simulator training. The students in the intensive program completed their FAA Private Pilot certificates in an average of 5 weeks (not including simulator time). Moreover, the intensive program group earned their private pilot's certificate in statistically significantly fewer hours ( $M=46.03$ ) than the conventional collegiate flight training group ( $M=76.06$ ). The intensive group returned to conventional training and completed their Commercial certificates in an average of 20 weeks and CFI qualifications in an average of 40 weeks.

The sixteen Vaughn College students comprised three cohorts who participated in an intensive SBT program six years ago. These students began their flight by traveling to the southwest US, stayed near a small airport and undertook a short duration, intensive simulator-based, ab initio flight training program. Later, the students returned to New York and completed the remaining flight qualifications required for their Bachelors' degrees in Aircraft Operations. The FAA qualifications for the BS degrees include Private, Instrument, Commercial, Multi-Engine, and Certified Flight Instructor. Each cohort of five to eight students traveled and studied together, following an intensive, simulator-based program. The students had to meet several criteria, including having a G.P.A. of 3.0 or better, possessing an FAA Class III Medical Certificate, taken a demonstration flight, successfully passed the FAA private pilot knowledge exam, obtained financial counseling and agreed to remain substance free during the training period.

The students were expected to travel between the Texas (TX) and New York (NY). The Texas group was to complete intensive SBT, then return to New York to complete their academic studies and finish their FAA flight qualifications (private, instrument and commercial) as needed. The students stayed in the Texas for 4-6 weeks at a time, undergoing training in simulators and aircraft six days per week. Students lived in a hotel and dined together. As the program unfolded, the second cohort group could only travel to the Texas flight school twice – for private pilot and instrument training. The third group only participated in the Texas, SBT for their private pilot training.

Back in New York, they followed conventional training that offered some simulator practice. Lessons in New York were spaced over time and students had conventional opportunities for group interactions. The conventional training in New York was conducted at a Part 141 flight school, located about an hour's drive from Vaughn College. By fall 2013, all students attended the conventional flight training at this Part 141 flight school. Students had limited access to simulators at the flight school and at Vaughn College.

In February and March 2017, semi-structured interviews and structured questions with Likert scale answers were conducted with the original three cohorts of the sixteen students. The interviews were coded and examined for themes related to a priori questions of predictors of learning and impact on careers. The authors met to discuss results and conclusions to ensure agreement of interpretations. This follows accepted qualitative methods of analysis (Creswell, 2013). In 2018 and 2019, the structured questions were sent via Survey Monkey to the original conventional training group, but only four responses were obtained to date. A more detailed follow-up study using telephone calls is planned. The progress in terms of FAA qualifications earned for both the intensive, SBT, Texas group and the conventional, NY training groups were obtained by examining FAA records.

Outreach to each student included one to several contacts by one or more of the program instructors and administrators. Most students expressed delighted willingness to participate in the interviews, but two of the cohort members were not interviewed. One of the non-responders agreed to the interview but did not participate. The second did not respond to any of the contacts. Some information on the progress of these two non-responders was obtained by looking up publicly available records, including the FAA airmen database, Linked-In and Facebook. The career paths of the two non-responders appear similar to those of their cohort members' paths (see below). The non-responder who did not participate in the interview obtained some flight qualifications and is working at a local, large airport and has recently returned to flight training. The second non-responder obtained flight qualifications up to ATP Instrument and two type ratings and is flying as a first officer for a regional airline.

## Results

Of the original sixteen TX students, fourteen completed interviews (11 m, 3 f) in 2017. They answered both Likert scale questions and qualitative, unstructured questions. The original 36 NY students were sent questionnaires containing just the Likert scale questions in 2018 via email. Despite three different email follow up requests, only four have responded. Additional information about both groups was obtained by examination of FAA records, social media and alumni events.

All but two of the TX interviewees had obtained a Bachelor's degree in equal proportions between aeronautical science, which required flight qualifications as part of the degree and aircraft operations, which allows elective credits for flight qualifications (See Figure 1) (Lubner et al., 2015, 2017). For both groups, private pilot training, instrument training, and commercial pilot training were all conducted in both the airplane and the flight simulator, but the TX group had far more simulator time.

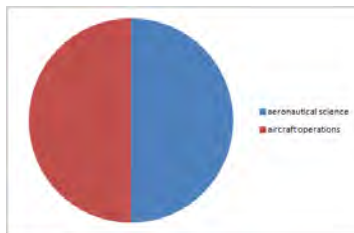


Figure 1: TX Cohort's undergraduate major:

The qualitative information on the TX students showed that the following were helpful to them: flight instruction, having a mentor available while training, training in the full motion flight simulator, and intense delivery of training improved the initial quality and subsequent duration of their flight skill development and knowledge retention as well as camaraderie, mentorship and savings in terms of time and money to complete their academic and flight studies.

The TX students valued their friendships and believed that the camaraderie, joint study sessions and to “practice flying together” were important in developing their flight skills. As one student stated, “we can discuss and learn from each other,” while another student stated, “we share the same passion and support each other”. One student commented that, “healthy competition builds motivation.” The NY students also valued forming good friendships in their program, noting that they are still friends with their cohort members, ranging from 2 to 15 friends. They all agreed that their pilot friends help to improve their acquiring and importantly, maintain their flight knowledge and skills. As one NY student stated, “It’s impossible to do it (flight training) alone. One of the things I did was study with my friends to pass all my tests. Honestly it’s necessary; it keeps your life balanced with school and social...” The TX students felt that their career goals were met, and that they were now mentors themselves. Having a mentor on site was considered a great advantage. The students felt that they could ask questions of the mentor that they were not comfortable asking of the flight instructors. As one noted, “I felt that the mentor was my advocate”. The NY students reported that their friends served as aviation mentors. Two students believed that serving as a mentor themselves would help improve their own flight skills and knowledge. This group did not find formal mentors to be an important part of their flight training.

Of the NY students whose qualitative information is available, three students report being on a path towards achieving their career goals, although two are not currently employed in aviation. Two students have left the aviation field altogether. These NY students stated that their flight training program was useful to their career goals of eventually becoming professional pilots. All students believed that they retained their flight knowledge and skills better when they learned them over a longer time. The TX students were able to spend a portion of their intensive program living and studying at the flight school, which they noted was helpful in developing camaraderie, study groups, and additional practice time in the simulator and airplane. They were allowed to stop out and then catch up with their regular college courses when they returned from TX.

Most of the TX group was also awarded scholarships at a later stage of their programs to allow them to complete their flight instructor ratings. The NY students, however, were not specifically targeted to receive scholarship

money. They remained in the regular college schedule. Because of the geographical location of the college in the largest US city, any flight student must fly well outside the metropolitan airspace. The students noted that the distance between the flight school and college was an obstacle to their progress. The commute took several hours per day, making it particularly difficult to attend classes and flight lessons on the same day.

The TX students felt that their career goals were met. Of the 12 TX interviewees who have obtained their BS, 11 are currently employed in paid pilot positions (See Figure 2 for a breakdown of employment positions). All interviewees said that their career goals have been met, or they were approaching their goals. One interviewee is on a hiatus from obtaining additional flight licenses and ratings due to medical reasons.

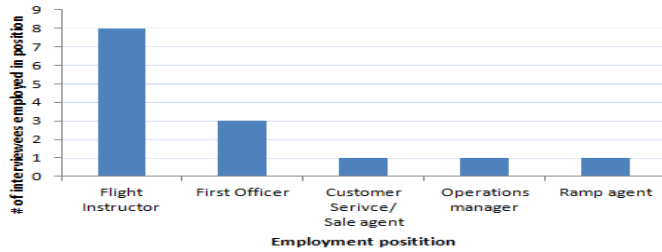


Figure 2: Employment positions.

In terms of flight training, as previously reported (Lubner et al., 2015, 2017), the TX students obtained their FAA Private Pilot Certificates in fewer hours than the NY group (see Figure 3). However, the time for the TX group to obtain Private Certificates was an average of 15 months, while the NY group took an average of 17 months. All TX students went beyond their Private Certificates, while many of the NY group did not progress beyond this qualification at the six year follow up point.

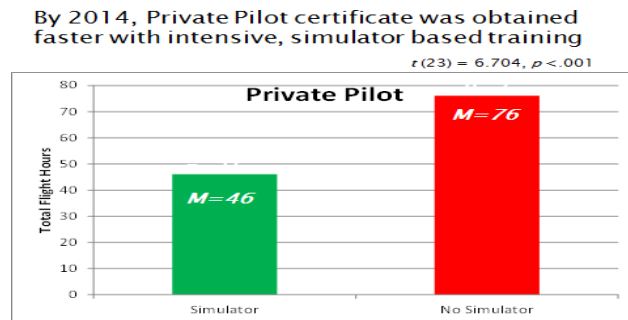


Figure 3: Two-year Follow-Up: FAA Private Pilot obtained in significantly different numbers of flight hours.

After six years, we can see that there is a statistically significant difference in terms of numbers of advanced pilot qualifications, including ATP, with the TX group far exceeding those of the NY group. This difference can also be represented as showing significant differences in terms of greater numbers of advanced qualifications obtained by

**Table 1. Trained \* License Cross-tabulation**

Chi square is  $X^2(4) = 12.247, p = .016$ .

Count

		License					Total
		ATP	Flight Instructor	Commercial	Instrument	Private	
Trained	New York	2	4	6	2	8	22
	Texas	7	5	2	2	0	16
Total		9	9	8	4	8	38

the TX group than the NY group (see Figure 4). All the TX students went beyond the Private Pilot qualification.

**Table 2. Ranks**

Mann-Whitney U = 71.0, p < .001

	Trained	N	Mean Rank	Sum of Ranks
License	New York	22	24.27	534.00
	Texas	16	12.94	207.00
	Total	38		

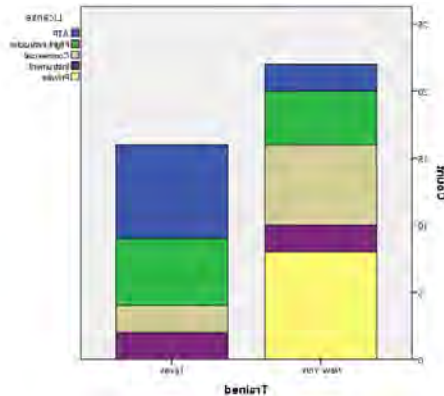


Figure 4: Six Year Follow-Up: TX group obtained statistically significantly more advanced FAA flight qualifications than the NY group, as represented by bar and pie charts.

The potentially useful aspects of the intensive program are discussed, including type of training such as intensive classroom, simulator and traditional in-aircraft instruction in addition to the psychosocial impacts of camaraderie and shared learning experiences (Lubner, et al., 2105, 2017).

**Conclusion**

In January 2012, Vaughn College, in New York City, launched a flight training program in partnership with a new training entity in Texas. Three cohorts of students participated over the next 18 months. While in Texas, these students flew twice a day five to six days a week, had constant access to simulators and were encouraged to use them to practice beyond their two flight lessons per day. Once students acquired a baseline of knowledge and skill, the simulators were more helpful to the training process, noted when conducting their Instrument training. Later, some of them obtained scholarships to enable them to complete their FAA CFI ratings. Over the same time period, a larger group of students remained in New York, where they continued traditional college level courses and conventional flight training at a Part 141 certified flight school. This group formed a natural comparison group.

Six years later, it is clear that the intensively trained, TX group progressed faster and further in their careers as professional pilots, obtaining statistically significantly more FAA pilot qualifications, including Private, Instrument, Commercial, Multi-Engine, Certified Flight Instructor and Airline Transport Pilot. All of those in the TX group went beyond their Private Pilot Certificate. Proportionally more of the TX students are employed in the aviation fields, including as professional pilots. With roughly two-thirds of the TX students currently flying as a profession and almost all involved in the aviation industry, the results indicate that the intensive SBT program assisted students in achieving their goals at follow-up. Subjectively though, the TX students felt that the intense program assisted the retention of their skills, while the NY students reported that learning over a longer period enhanced their knowledge and skills.

As stated by several members of the TX group, theirs was an intense form of training that required commitment, focus and a strong desire to achieve their goals. As demonstrated in the interviews, the aid of an on-site mentor, someone who had been both a flight instructor and was a current commercial airline pilot, supported student learning by providing additional information, advocacy and encouragement through the process. The NY group found mentors and support among their pilot friends.

Both groups noted that camaraderie and friendships with other pilots supported their acquisition of flight knowledge, skills and helped maintain their motivation to fly over time.

More robust follow-up is needed to obtain insights into the relative importance of SBT, intensity of training itself and the role of friendships and mentoring activity in helping to maintain students' focus and motivation. Structural obstacles, such as commuting time between flight school and college campus, professional mentors, and availability of SBT could be discovered and hopefully rectified in future studies.

### References

- Aircraft Owners and Pilots Association (AOPA) (2010) The Flight Training Experience: A Survey of Students, Pilots and Instructors. <http://www.aopa.org/>
- Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Airline and Commercial Pilots. <https://www.bls.gov/ooh/transportation-and-material-moving/airline-and-commercial-pilots.htm> (visited March 12, 2019).
- Creswell, J.W. (2013). *Qualitative Inquiry and Research Design (3rd ed.)* Los Angeles: Sage
- Dalgarnoa, B., Kennedy, G. and Bennett, S. (2014). The impact of students' exploration strategies on discovery learning using computer-based simulations. *Educational Media International*, Vol. 51, No. 4, 310–329, <http://dx.doi.org/10.1080/09523987.2014.977009>
- Dattel, A. R., Kossuth, L., Sheehan, C. C., & Green, H. J. (2013). Poster presented at the *84th Annual Meeting of the Eastern Psychological Association*. New York, NY.
- Dattel, A. R., Durso, F. T., & Bédard, R. (2009). Procedural or conceptual training: Which is better for teaching novice pilots landings and traffic patterns? *Proceedings of the 53rd Annual Meeting of the Human Factors and Ergonomics Society*. San Antonio, TX.
- FAA(2008). Aviation Instructor's Handbook. Retrieved from [http://www.faa.gov/about/office\\_org/headquarters\\_/avs/offices/afs/afs600](http://www.faa.gov/about/office_org/headquarters_/avs/offices/afs/afs600)
- FAA (2008) Advisory Circular (AC) 00.2-15. Retrieved from [www.faa.gov](http://www.faa.gov).
- Goetz, S., Harrison, B. and Voges, J. (2015). The use of FAA flight training and aviation training devices at UAA institutions. *Collegiate Aviation Review*, 44 – 59.
- Gopher, D., Weil, M., Bareket, T. (1994). Transfer of skill from a computer game trainer to flight. *Human Factors*, 36, 387-405.
- Gopher, D., Sivan, R., & Iani, C. (2001). Comparing learning curves of experts and novices. *Proceedings of the Human Factors and Ergonomics Society*. 2, 1805.
- Harris, D. (2011) *Human Performance on the Flight Deck*. Brookfield, VT: Ashgate.
- Koglbauer, I. (2016). Simulator training improves pilots' procedural memory and generalization of behavior in critical flight situations. *Cognition, Brain and Behavior*. XX:5 (December), 357-366.
- Koglbauer, I., Riesel, M. and Braunstingl, R. (2016). Positive effects of combined aircraft and simulator training on the acquisition of visual flight skills. *Cognition, Brain and Behavior*. XX:5 (December), 309-318.
- Lubner, M.E., Dattel, A.R., Henneberry, D., DeVivo, S. (2105) Follow-Up Examination of Simulator-Based Training Effectiveness *18th International Symposium on Aviation Psychology*, Dayton, Ohio.
- Lubner, M.E., Dattel, A.R., Henneberry, D., DeVivo, S. (2107) Four-Year Follow-Up of Intensive, Simulator-Based Pilot Training *19th International Symposium on Aviation Psychology*, Dayton, Ohio.
- McLean, G. M. T., Lambeth, S. and Mavin, T. (2016). The Use of Simulation in Ab Initio Pilot Training. *The International Journal of Aviation Psychology*, 26:1-2, 36-45, DOI: 10.1080/10508414.2016.1235364 <http://dx.doi.org/10.1080/10508414.2016.1235364>
- Salas, E., Bowers, C. A., & Rhodenizer, L. (1998). It is not how much you have but how you use it. *The International Journal of Aviation Psychology*, 8, 197-208.
- Taylor, H. L., Lintern, G., Hulin, C. L., Talleur, D. A., Emanuel, T. W., & Phillips, S. I. (1999). Transfer of training effectiveness of a personal computer aviation training device. *The International Journal of Aviation Psychology*, 9, 319-335.