FITS Research Panel
June 23, 2005

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and
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SAFER
SATS Aerospace
Flight Education Research

NASA Research Cooperative Agreement
NCCI - 03032
NASA
Small Aircraft
Transportation System
Research Demonstration
and Expo
Danville, VA June 6-8
“FAA Industry Training Standards
Scenario Based
Private / Instrument Syllabus for
Technically Advanced Piston Aircraft”
was approved by FAA Headquarters
in Washington D.C. and at the Nashville FAA Flight Standards
District Office, as a part of MTSU’s existing
Air Agency Certificate
FAA Exemption 8456 to 61.65(a)(1)
The first SAFER cohort of 16 students started in August 2004 and concluded in the spring of 2005. 10 of the first 16 have now completed the program (62.5%).

Of the 10 who have completed, 8 passed the combination Private/Instrument Practical Test on the first attempt.

The average combination Private/Instrument Practical test flight time has been 2.2 hours. The oral exam has averaged approx 2 hours. Students averaged 90.3 hrs of training on the day of their checkride. 1,600+ total flight hours so far.
Setbacks Comparison
Caution: Preliminary data using small numbers

<table>
<thead>
<tr>
<th>Stage</th>
<th>Traditional</th>
<th>SAFER</th>
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<tbody>
<tr>
<td>Pre Solo</td>
<td>77 of 449 17.1%</td>
<td>59 of 97 60.8%</td>
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<tr>
<td>Pvt &amp; X-C</td>
<td>169 of 449 37.6%</td>
<td>15 of 97 15.4%</td>
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<tr>
<td>Instrument</td>
<td>203 of 449 45.2%</td>
<td>23 of 97 23.7%</td>
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Will students who learn to fly with an emphasis on scenarios instead of maneuvers, develop ‘stick and rudder’ skills?

What the examiners are saying-

“Mr. X performed very well. This is especially true when demonstrated his ability to fly Private Pilot maneuvers. I was very impressed with his general aircraft control.”

“They (SAFER Students) also seem to have no problem during no-gyro (AHARS failure) operations.”

Responses from Practical Test critiques from FAA examiners
Will students who learn with ‘glass’ ever look outside the airplane for traffic?

What the examiners are saying-

“The major distraction that I noted was that he tended to look inside the cockpit far more than I would have liked to have seen.”

“The large flight-instrument system sitting right in front of the pilot is very difficult to ignore. I would suggest that the instructors stress composite flight techniques much more. Hopefully this would get the students eyes out of the cockpit more.”

“Although meeting the standards of the PTS, there were two areas where Mr. Z’s performance was only average. The first area was clearing during VFR maneuvers. He accomplished clearing turns prior to maneuvers, however, with the G-1000 PFD and MFD so prominently displayed, there is a tendency to keep his attention inside the cockpit rather than outside.”

“He (the applicant) handled the diversion without any problems. I was impressed with the traffic advisory function of the MFD. He monitored the map closely and called out several aircraft before I saw them.”
How is the combination Private / Instrument checkride going?

What the examiners are saying-

“During the oral portion of the test, Private and Instrument questions were intermingled. This technique was used to make the test more uniform, provide a scenario-type approach to the questioning, and to eliminate some duplication that would be necessary if Private Pilot questions were covered first and then Instrument rating questions covered separately.”

“Mr. Y did as well or better than most conventionally trained students during the instrument oral examination.” (Mr. YYY has 92 total flight hours when we took the combination VFR/IFR checkride)

“The primary weak areas that I have noted on this, and several other SAFER student evaluations have been during the oral portion of the evaluation. Obviously some students have been weaker than others. I feel that a great deal of basic, required knowledge material is being either missed or covered so fast that the student is not absorbing and understanding the material.” (mid)

“All sections of the oral portion of the PTS were covered with a special emphasis on airplane performance and computation. I particularly wanted to delve deeper into these areas due to the fact that I had found the SAFER students to be weak in this area on previous exams. Mr. U showed immediately that this was no problem for him. I might add that Mr. FAA from the local FSDO sat in on the majority of this oral evaluation. There were no weak areas noted. Mr. FAA felt much the same as I did toward Mr. U’s general knowledge.” (late)
How is the combination Private / Instrument checkride going?

What the examiners are saying-

“During the flight portion of the instrument test, two non-precision approaches were flown. One VOR approach with the AHARs circuit breaker pulled. Pulling the circuit breaker disabled the primary attitude and heading references as well as the turn coordinator and inclinometer. Mr. S simply transferred his instrument scan to (the) back-up attitude indicator and the magnetic compass and continued to fly the approach without significant problems.”

“An ILS approach was also conducted. I had Mr. Q fly the full procedure turn utilizing the complete PFD and MFD. He demonstrated this approach almost flawlessly. This demonstration was far better that the average, conventional applicant, however with all the “super-sized” avionics in front of the pilot makes it is much easier and more precise.” (early)

“At this time we reverted to instruments, obtaining a clearance in the air and required GPS holding and a LOC approach. It was a very busy time for him (the applicant), but he handled the situation quite well.”

Responses from Practical Test critiques from FAA examiners
Have there been problems with ‘technology transfers’
both old-to-new and new-to-old?

What the examiners are saying-

“Up to this point, none of the students have had any significant problems with getting behind the aircraft due to these switch operations. Their hand-eye-brain coordination far exceeds mine when dealing with these new, technical, instruments. Based on what I have seen so far, I do not believe they will have any significant difficulty transitioning to the conventional displays.” (late)

“Takeoff and climb out were normal, however, as soon as we cleared the traffic pattern to begin our cross-country, he immediately turned on the autopilot. I allowed him to continue for a few minutes and then directed him to “hand-fly” the airplane. I explained that I knew the autopilot could fly the airplane and that my job was to determine if he could. He then informed me that his instructor had always encouraged him to use the autopilot when available and that this would free him up to clear better.” (early)

Responses from Practical Test critiques from FAA examiners
What did the students who finished the program have to say?

What the students said about the combination syllabus-

“For me this was not two courses, but one body of knowledge. I can go back now and pick out what was ‘Private (Pilot) knowledge’ a what was ‘Instrument knowledge’.”

“Studying IFR and VFR seemed to be all the same to me.”

“I had never flown before, so I did not know any difference.” (the fact that traditional students learn VFR and IFR separately)

“It seemed like one big thing instead of two courses.”

“Awesome!”

“I understand that my interview for a commercial pilot job started several months ago when SAFER started.”

Responses from open-ended interviews with SAFER student participants
What did the students who finished the program have to say?

What the students was the hardest thing in SAFER-

“Partial-Panel holding.”

“Landings”

“When the AHRS was out and had to fall back on round dials.”

“My biggest problem was with rudder control.”

“I have never experience ‘reverse needle sensing’ but I have heard about it. That might be a problem later.”

“ADF questions on the written test.”

What the students was the easiest thing in SAFER-

“Approaches were easier than Turns Around a Point.”

“Use of ‘the screens’ (G-1000) was natural.”

“The class was fine (SAFER version of AERO 2230), it used ‘real world’ stuff.”

“Using the G-1000 was not tough. The ‘soft keys’ are just like on my cell phone that perform different duties depending on what mode you are in.”

Responses from open-ended interviews with SAFER student participants
What did the students who finished the program have to say?

What the students said as advice to future students-

“You have to be ready to learn three things in SAFER: Private stuff, Instrument stuff, and G-1000.”

“The work is about 30% Private stuff and 70% Instrument stuff.”

“Manage your time.”

“You gotta be where you gotta be.”

“If you party you will get behind.”

Responses from open-ended interviews with SAFER student participants
What did the students who left the program before completion have to say?

What the students said-

“When you get behind (in the SAFER syllabus) it is overwhelming.”
“There is something new everyday.”
“We were running before we walked – like teaching approaches and enroute stuff before basic stuff.”
“The extras (the IFR curriculum) were a distraction.”
“(I) need a ‘short Private’ followed by a ‘short IFR’ instead of all together.”
“I felt swamped and unable to catch up.”
“Everyone had to take a written test (FAA Private Pilot Knowledge exam) and with me being behind, it was just too much.”
“It (The SAFER syllabus) was like two parallel courses. The courses might have made an intersection up there in the future, but I couldn’t see it.”
“This opportunity may have been too soon for me.”
“Being ‘college prepared’ would have been helpful – another student in the project is a little older and has more college than me – he seemed to do better.”
“I do things better step-by-step.”
“This was killing two birds with one stone, but I needed to break the stone in two and throw it twice.”

Responses from open-ended interviews with SAFER student participants
Comparing those who completed and those that did not-

The successful students seemed to view the FITS syllabus as a single course, whereas the unsuccessful students saw the FITS syllabus as two courses.

Successful students:

“For me this was not two courses, but one body of knowledge. I can go back now and pick out what was ‘Private (Pilot) knowledge’ a what was ‘Instrument knowledge’.”

“Studying IFR and VFR seemed to be all the same to me.”

“I had never flown before, so I did not know any difference.” (the fact that traditional students learn VFR and IFR separately)

“It seemed like one big thing instead of two courses.”

Unsuccessful students:

“We were running before we walked – like teaching approaches and enroute stuff before basic stuff.”

“The extras (the IFR curriculum) were a distraction.”

“(I) need a ‘short Private’ followed by a ‘short IFR’ instead of all together.”

“It (The SAFER syllabus) was like two parallel courses. The courses might have made an intersection up there in the future, but I couldn’t see it.”

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Responses from open-ended interviews with SAFER student participants
Comparing those who completed and those that did not-

The successful students seemed to recognize that the FITS syllabus would require a good deal of time and effort while the unsuccessful students had time management problems:

Successful students:

“Manage your time.”
“You gotta be where you gotta be.”
“If you party you will get behind.”
“The curriculum was not overly demanding for me, but I had funds available to fly, I took only 16 college credits, and I did not have to work outside of school.”

Unsuccessful students:

“When you get behind (in the SAFER syllabus) it is overwhelming.”
“There is something new everyday.”
“I felt swamped and unable to catch up.”
“Everyone had to take a written test (FAA Private Pilot Knowledge exam) and with me being behind, it was just too much.”
“Being ‘college prepared’ would have been helpful – another student in the project is a little older and has more college than me – he seemed to do better.”

Responses from open-ended interviews with SAFER student participants
The Second SAFER cohort began January 2005 and is ongoing at this time.

The Second SAFER cohort is using a combination of airplane and FTD training.

Note: The first student passed on the first attempt - June 15, 2005. Student had a total of 55 airplane hours and 23 FTD hours on the day she passed.
Areas of SAFER data yet to be analyzed...

>metrics and quantitative data
>Flight Instructor journals and other data
>Second cohort that began in January 2005
>Syllabus v. Glass – Third Cohort Fall 2005
SAFER Methodology Review

Archival data analysis and identification of ‘bottlenecks’ with non-TAA aircraft 1999-2004

First Cohort: TAA only with FITS Syllabus (Fall 2004)

Second Cohort: TAA & FTD with FITS Syllabus (Spring 2005)

Third Cohort: TAA & FTD with Traditional Syllabus (Fall 2005)
SAFER publications and presentations so far...

SAFER Project Briefing

Initial Findings of the SAFER Project
FITS Oversight Committee meeting, Daytona Beach, Florida. March 2005.

Times They are a-Changing
General Aviation News. March 2005

Ab Initio Training in the Glass Cockpit Era: New Technology Meets New Pilots
A Preliminary Descriptive Analysis.
International Symposium of Aviation Psychology
Oklahoma City, Oklahoma. April 2005

SAFER Glass
SATS2005 Expo and FAA ‘Wings’ Program
Danville, Virginia. June 2005

Scenario-Based Private/Instrument Syllabus versus Traditional Maneuver-Based Syllabi
Collegiate Aviation Review - Pending Review
Fall 2005
Questions?