20110627 - Ergonomization attitudes in general aviation - 2008

[<Normal page] [**PEREZGONZALEZ Jose D [ed] (2008[2]).** *Ergonomization attitudes in general aviation.* Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2011, pages 56-60.]

Casner explored the attitudes of general aviation pilots towards advanced cockpit systems (ACS, namely glass-cockpits) in 2008[1]. He asked a group of general aviation pilots from the California Bay area about their attitudes towards ACS. Although the majority of pilots did not have flying experience with glass-cockpit aircraft, Casner's research found that, in general, pilots believed that ACS were a positive step forward, even when they also perceived them to be potentially problematic (see table 1). These and other related attitudes towards ACS are collated in the following tables. The reader needs to note, however, that these attitudes are not necessarily based on direct experience, thus they may not be particularly reliable and may only represent an idealistic understanding of ACS and their features.

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Table of Contents

Table 1. General attitudes towards ACS		
attitude	**mean***	*interpretation*
Want more ACS features	4.17	agree
ACS may mean trouble	3.80	agree
ACS are too complicated	2.89	neutral
ACS depress flying skills	2.72	neutral
Feel like a button pusher	2.63	neutral
ACS has gone too far	2.14	disagree
*average value out of 5[3]		

Attitudes regarding workload

Table 2 collates results regarding cockpit workload. GA pilots typically considered ACS to be a favourable tool for managing workload, especially the autopilot, but also the GPS and related systems.

Table 2. Attitudes towards how ACS affect workload		
attitude	**mean***	*interpretation*
Autopilot lowers workload	4.50	strongly agree

GPS lowers workload	3.98	agree
Better workload management with ACS	3.72	agree
Too many warnings	2.86	neutral
Too much time operating autopilot	2.67	neutral
*average value out of 5[3]		

Attitudes regarding awareness

Table 3 collates results regarding situational awareness. GA pilots typically considered ACS as a tool that allowed them to gain more situational awareness when flying.

Table 3. Attitudes towards how ACS affect awareness

attitude	mean*	*interpretation*
Raised awareness with ACS	4.15	agree
Aware of GPS and autopilot modes	3.56	agree
More awareness without GPS	2.75	neutral
Do less sky scanning with TCAS	2.68	neutral
Worry of ACS's lack of transparency	2.68	neutral
Feel lost without GPS navigation	2.02	disagree
*average value out of 5[3]		

Attitudes regarding learning

Table 4 collates results regarding learning flying skills (especially for ab-initio pilots). GA pilots typically considered that learning on an ACS-equipped aircraft was more complex and took longer than on a conventional aircraft.

Table 4. Attitudes towards how ACS affect learning

attitude	mean*	*interpretation*
ACS require experience	4.06	agree
ACS require more learning/memory	3.93	agree
FAA should publish ACS handbook	3.83	agree
ACS restrict learning skills	3.78	agree
Flight tests should include ACS skills	3.77	agree
FAA tests should include ACS	3.75	agree
Don't understand ACS fully	3.66	agree
PIC should have ACS endorsement	3.47	neutral
GPS approaches are learnt fast	3.11	neutral
FAA guidance on ACS is sufficient	2.48	disagree
ACS technical manuals are comprehensive	2.47	disagree
*average value out of 5[3]		

Attitudes regarding flight proficiency

Table 5 collates results regarding how ACS affect retaining flight proficiency. GA pilots did not typically consider ACS as a threat to their proficiency, but neither considered them an advantage.

Table 5. Attitudes towards how ACS affect proficiency		
attitude	**mean***	*interpretation*
Need more ACS hours for proficiency	3.40	neutral
Worry to become dependent on ACS	3.17	neutral
Worry ACS affect basic flying skills	2.79	neutral
*average value out of 5[3]		

Attitudes regarding pilot error

Table 6 collates results regarding how ACS help manage pilot errors. GA pilots typically considered ACS as a tool that allowed them to capture and prevent specific errors much easily, although this might not help much with other errors (probably those not directly affected by ACS).

Table 6. Attitudes towards how ACS affect pilot error		
attitude	**mean***	*interpretation*
GPS reduce navigational errors	4.19	agree
ACS create new errors	4.07	agree
ACS reduce navigational and altitude errors	3.58	agree
ACS reduce pilot errors	3.18	neutral
It is easier to detect errors in ACS	2.86	neutral
*average value out of 5[3]		

Attitudes regarding safety

Table 7 collates results regarding how ACS help manage safety. In contrast to the results presented in table 6, GA pilots did not typically consider ACS as a good tool for managing safety. Indeed, although some features might help prevent some type of accidents (eg CFIT and mid-air collisions), other types of accidents may remain unaffected or may even increase, especially if pilots were to stretch safety margins because of their over-reliance on ACS.

Table 7. Attitudes towards how ACS affect safety		
attitude	**mean***	*interpretation*
Pilots will stretch safety with ACS	3.88	agree
Terrain displays will reduce CFIT	3.80	agree
TCAS will reduce mid-air collisions	3.71	agree
Weather displays will reduce weather accidents	3.49	neutral
ACS feel safer	3.20	neutral
GPS will reduce accidents	3.08	neutral
Aircraft with airframe parachutes feel safer	2.66	neutral

*average value out of 5[3]

Attitudes regarding use of ACS

Table 8 collates results regarding preference for specific ACS features. GA pilots did not typically consider ACS as a good tool for managing flight operations, except in circumstances where automation (ie autopilot) may reduce workload and where the displayed information may be easier to understand (GPS navigation versus VOR navigation).

Table 8. Attitudes towards using ACS features in flight

attitude	**mean***	*interpretation*
Prefer autopilot when high workload	4.34	agree
Prefer GPS to navigate	4.28	agree
Prefer autopilot when en route	4.03	agree
Prefer hand-flying when low workload	3.38	neutral
Prefer autopilot in instrument approach	3.37	neutral
Prefer autopilot in missed approach	2.98	neutral

*average value out of 5[3]

Methods

Research approach

- This was an exploratory study of general aviation pilots' attitudes towards advanced [glass] cockpit systems.

Sample

- A convenient sample of 134 general aviation pilots from California Bay Area.
- The sample comprised the following demographics: pilots holding a PPL (66.4%), CPL (26.1%) and ATPL (7.5%); flight instructors (13.4%), other (non-student) pilots (86.6%).
- Other demographic variables of interest: median flight time = 650 hours; median flight time with some GPS navigation = 155 hours; median flight time on advanced glass-cockpits = 0 hours.

Materials

- A questionnaire surveying 52 attitudinal variables, plus 5 multiple-choice / supply-type. The attitudinal variables were regarding advanced cockpit systems, of which 50% were expressed positively and 50% negatively. They required an assessment of personal agreement, measured on a 5-point Likert scale ranging from "Strongly agree" to "Strongly disagree".
- The questionnaire 'probed' nine topic areas: general attitudes towards advanced cockpit systems, workload, awareness, learning, retention, error, safety, preferences for in-flight use, and overall preferences.

Procedure

- Pilots were approached in person and invited to participate in the research ad-hoc (paper and pencil survey).
- All responses were anonymous.

Data analysis

- Quantitative analyses, including univariate (namely descriptives and histograms) and bivariate statistics (namely correlations).

Generalization potential

Given the exploratory approach of the research and the small sample and its convenience, the results from this study may not have enough scope for generalization. They could be indicative of similar attitudes in the following 'populations' (in order of decreasing generalization power):

- General aviation pilots with characteristics similar to this sample, namely California-trained pilots, using airplanes, flying for business (including instructing other pilots), and holding private or commercial licences.
- General aviation pilots of similar characteristics working in the US.
- General aviation pilots of similar characteristics working elsewhere.

References

1. **CASNER Stephen M (2008).** *General aviation pilots' attitudes toward advanced cockpit systems.* International Journal of Applied Aviation Studies, 2008, volume 8, number 1, pages 88-112.
+++ **Footnotes** +++ [[size smaller]]
2. Adapted with permission from **PEREZGONZALEZ Jose D [ed] (2008).** *Ergonomization attitudes in general aviation.* AviationKnowledge (ISSN 1179-6685), 2011, page 1.
3. Pilots rated each attitude according to a 5-point Likert-scale running from "1, Strongly disagree" to "5, Strongly agree". The mean is the average of their responses.

Want to know more?

AviationKnowledge - Ergonomization
This AviationKnoweldge page offers further information on aviation ergonomization.
Casner's (2008) article
The original article expands these results further, incorporating comparisons with previous research, and providing histogram charts for most results.

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