20110622 - Ergonomization needs in general aviation

[<Normal page] [**PEREZGONZALEZ Jose D (2010**[4]**).** _Ergonomization needs in general aviation._ Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2011, pages 52-55.]

Perezgonzalez, Gilbey and Diaz Vilela explored the ergonomization needs of general aviation pilots in 2010[3]. Namely, they asked a group of pilots which technological features (including costs) they thought were important to their main general aviation flight activity. The group was mostly made of New Zealand and North American pilots flying for purposes such as training, instructing, business and recreation. Yet, it included airplane, helicopter and glider pilots, male and female pilots, and pilots with licences ranging from no-licence (ab-initio student) to ATPL.

The research found that, overall, the cost (of acquisition and operation) of any technology was the main worry for general aviation pilots (the results also suggested that this might be more important than any other benefit the technology may bring to their flying). Yet, among ergonomic features, all those supporting flight operations (from the calculation of weight and balance to traffic avoidance features) were also of medium importance. Less important were features such as tracking and real-time monitoring, followed by post-flight analysis and 3-D displays.

Table 1. Relative importance of ergonomization features to GA pilots		
group of features	**mean***	_interpretation_
Low cost	3.4	medium importance
Flight support	2.8	medium importance
Monitoring	2.4	little importance
Post-flight analysis	2.0	little importance
3-D display	1.9	little importance
*average value out of 5[5]		

Also of interest was the importance attached to cockpit ergonomization by the different demographic groups.

Ergonomization by gender

Overall, female pilots gave less importance to ergonomization (including costs) than male pilots.

Table 2. Relative importance of ergonomization features to GA pilots, by gender				
group of features	**male pilot***	_interpretation_	**female pilot***	_interpretation_
Low cost	3.5	important	2.7	medium importance
Flight support	2.9	medium importance	2.0	little importance
Monitoring	2.4	little importance	1.6	little importance
Post-flight analysis	2.0	little importance	2.1	little importance
3-D display	1.9	little importance	1.5	little importance
*average value out of 5[5]				

Ergonomization by aircraft type flown

Airplane pilots showed results similar to those discussed for the overall sample (see table 1). In contrast, helicopter pilots valued monitoring features more than other pilots, but also placed lesser importance on 3-D displays, while glider pilots considered both post-flight analysis features and costs as more important than the other two groups did.

Table 3. Relative importance of ergonomization features to GA pilots, by aircraft type most often flown						
group of features	**airplane pilot***	_interpretation_	**helicopter pilot***	_interpretation_	**glider pilot***	_interpretation_
Low cost	3.4	medium importance	3.0	medium importance	4.0	important
Flight support	2.9	medium importance	2.5	medium importance	2.5	medium importance
Monitoring	2.3	little importance	3.5	important	2.0	little importance
Post-flight analysis	2.0	little importance	1.6	little importance	4.5	very important

| 3-D display | 1.9 | little importance | 1.4 | very little importance | 2.0 | little importance |

*average value out of 5[5]

Ergonomization by flight activity

Commercial pilots (i.e. those operating for business) and recreational pilots gave, overall, less importance to ergonomization, although the latter group still considered low costs as being important. Pilots in training as well as instructors gave more importance to ergonomization. It is interesting that instructors considered 3-D displays as important, but the student pilots did not.

Table 4. Relative importance of ergonomization features to GA pilots, by main flight activity								
group of features	pilot in training*	interpretation	instructor*	interpretation	commercial pilot*	interpretation	recreational pilot*	interpretation
Low cost	3.5	important	3.7	important	2.8	medium importance	3.5	important
Flight support	3.0	medium importance	3.2	medium importance	2.5	medium importance	2.2	little importance
Monitoring	2.8	medium importance	3.4	medium importance	2.1	little importance	1.1	very little importance
Post-flight analysis	2.5	medium importance	2.3	little importance	1.5	little importance	1.9	little importance
3-D display	2.0	little importance	3.6	important	1.6	little importance	1.3	very little importance

*average value out of 5[5]

Ergonomization by type of licence

Overall, the groups with the lowest (PPL) and the highest (ATPL) licences gave less importance to cockpit ergonomization than other pilots, while training pilots (without a licence) valued cockpit ergonomization more than the remaining groups.

Table 5. Relative importance of ergonomization features to GA pilots, by type of licence held								
group of features	no licence*	interpretation	PPL*	interpretation	CPL*	interpretation	ATPL*	interpretation
Low cost	3.4	medium importance	3.4	medium importance	3.4	medium importance	3.2	medium importance
Flight support	3.1	medium importance	2.6	medium importance	3.1	medium importance	3.4	medium importance
Monitoring	3.2	medium importance	1.6	little importance	3.1	medium importance	2.0	little importance
Post-flight analysis	2.6	medium importance	1.7	little importance	2.0	little importance	2.1	little importance
3-D display	1.7	little importance	1.8	little importance	2.4	little importance	2.0	little importance

*average value out of 5[5]

Ergonomization by country

Overall, pilots valued ergonomization similarly, independent of country of residence or operation. However, the results might suggest that American pilots valued low costs slightly more and monitoring features slightly less than New Zealand pilots.

Table 6. Relative importance of ergonomization features to GA pilots, by country of residence				
group of features	NZ pilot*	interpretation	USA pilot*	interpretation
Low cost	3.4	medium importance	3.5	important
Flight support	2.8	medium importance	3.1	medium importance
Monitoring	2.6	medium importance	1.5	little importance
Post-flight analysis	2.1	little importance	1.6	little importance
3-D display	1.8	little importance	2.1	little importance

*average value out of 5[5]

Methods

Research approach

- This was an exploratory study of general pilots' valuation of new technologies for aviation.

Sample

- A convenient sample of 70 general aviation pilots participated in the research.
- The sample comprised the following demographics: New Zealand pilots (n=53), US pilots (n=16) pilots and 1 Australian pilot; men (n=66) and women (n=4); airplane pilots (n=63), helicopter pilots (n=5) and glider pilots (n=2); flying under training (n=22), while instructing (n=5), for business (n=15) and for recreation (n=12); and holding ho licence (n=11), PPL (n=24), CPL (n=22) and ATPL (n=6).

Materials

- A questionnaire with a list of 22 technological features, adapted from Perezgonzalez and Lee *(2009a[1], see also 2009b[2])*. The questionnaire collated technological features present in three different GPS-based technologies with aviation applications: a real-time fleet tracking technology (Spidertracks), an iPhone application for tracking flight parameters for post-flight analysis, and a flight management system application which runs on Microsoft Windows-capable devices.
- The questionnaire was placed online at SurveyMonkey.com. It required a valuation of each technological feature on a 6-point Likert scale ranging from "0, Not important" to "5, Very important".

Procedure

- An invitation to participate in the research was made to the president or secretary of aviation clubs and aviation schools listed both in an in-house list of New Zealand clubs and in an international list of clubs hosted by ThirtyThousandFeet.com. The proviso was for them to pass the invitation to other members of the club, as well.
- They were provided with a link to the online survey, for completion.
- All responses were anonymous.

Data analysis

- Quantitative analyses, including univariate (namely descriptives), multivariate (principal component analysis) and bi-variate analyses (t-tests for independent samples), using SPSS version 16.
- The principal component analysis produced 5 components, which were subsequently used as variables, instead of the 22 single technological variables.

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 New Zealand and US pilots, male, mostly using airplanes, flying for business, recreation or under training, and holding either a private or commercial licence.
- General aviation pilots of similar characteristics but working in other countries than New Zealand and the US.

References

1. **PEREZGONZALEZ Jose D & Seung Yong LEE (2009a).** *New technologies for the student pilot.* Aviation Education and Research Proceedings (ISSN 1176-0729), volume 2009, pages 10-11.
2. **PEREZGONZALEZ Jose D (2009b).** *Ergonomization needs of student pilots.* Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2011, pages 48-51.
3. **PEREZGONZALEZ Jose D, Andrew GILBEY & Luis DIAZ VILELA (2010).** *New technologies in general aviation.* Aviation Education and Research Proceedings, volume 2010, pages 55-59. ISSN 1176-0729.
+++ **Footnotes** +++
4. Adapted with permission from **PEREZGONZALEZ Jose D (2010).** *Ergonomization needs in general aviation.* AviationKnowledge (ISSN 1179-6685), 2010, page 5.
5. Pilots rated the importance of various technological features to their GA flying according to a 6-point Likert-scale running from "0, Not-important" to "5, Very important". The mean is the average of their responses when grouped by features.

Want to know more?

AviationKnowledge - Ergonomization
> This AviationKnoweldge page offers links to further information on aviation ergonomization.

Perezgonzalez et al's (2010) article
> The original article provides further detail about the research. You can find it under the "2010 Symposium Proceedings" tab, as PEREZGONZALEZ Jose D (2010). *Reliability analysis of assisted-GPS technologies for post-flight analysis.* Aviation Education and Research Proceedings, volume 2010, pages 53-54. ISSN 1176-0729.

Wiki of Science - Ergonomization needs of student pilots
> This Wiki of Science page summarizes the pilot study behind the research described here.

Author

Jose D PEREZGONZALEZ (2010). Massey University, Turitea Campus, Private Bag 11-222, Palmerston North 4442, New Zealand. (_JDPerezgonzalez_ JDPerezgonzalez).

Peer-reviewers

Stuart ANDERSON (2010). School of Aviation, Massey University, New Zealand (_stuartanderson_ stuartanderson).
Amber WAN (2010). School of Aviation, Massey University, New Zealand (_Amber Wan_ Amber Wan).

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