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Qualitative Assessment of General Aviation Pilots' Perceptions of Preflight Weather Briefings

Prior to departing on a flight, General Aviation pilots complete a pre-flight planning process to ensure the safety of their flight. One aspect of the pre-flight planning process is obtaining a briefing on the weather conditions that the pilot might encounter along their flight route. Traditionally pilots have utilized a phone-in service run by Flight Services to aid in their assessment of weather conditions. However, research indicates that pilots are increasingly reliant on conducting self-briefing using online resources. The purpose of this study is to determine pilot perceptions of obtaining a phone-in brief in comparison to self-briefing.

BACKGROUND

Weather-related accidents represent one of the highest threats for General Aviation (GA) pilots (Air Safety Institute [ASI], 2019). Fatal accidents can occur when pilots fly without proper instruments into unexpected weather hazards. In order to gain an understanding of the weather and avoid such situations, it is essential for pilots to conduct a thorough preflight weather briefing. The purpose of this paper is to examine GA pilots' perspectives on two overall strategies of obtaining preflight weather briefings: call-in vs. self-briefing.

Preflight Weather Briefing

Prior to flight, General Aviation (GA) pilots must obtain a preflight weather briefing (Code of Federal Regulations [CFR], 2021). Figure 1 illustrates the breakdown of different options for obtaining a preflight weather briefing. Generally, weather briefings can be divided into two categories: *self-briefings* and *assisted briefings*. In an *assisted briefing*, the pilot telephones Flight Services (1-800-WXBRIEF) where a flight service specialist (FSS) relays the observed and forecasted weather conditions to the pilot and provides a recommendation of whether flying without instruments (Visual Flight Rules [VFR]) is or is not recommended (also known as the VFR Not Recommended (VNR) statement).

*In the event of an incident or accident, investigators can review what information was presented to the pilot.

+Currently contracted to Leidos.

Note: There are no requirements in CFR to review specific products it is up to the Pilot In Command (PIC) to review whatever they deem necessary before flight. It is good practice however, that the PIC uses a method of obtaining weather information that records a log of their preflight weather briefing.

Figure 1. Preflight Weather Planning Options

Alternatively, pilots can perform a weather *self-briefing* by reviewing weather information independently. *Unstructured self-briefing* entails a pilot accessing weather products (e.g., current weather observations and forecasts) either from an online resource (e.g., National Oceanic and Atmospheric Administration [NOAA], National Weather Service [NWS], Aviation Weather Center website [AWC]) or a televised weather source (e.g., Weather Channel [not FAA-approved]) (NOAA, 2019; National Weather Service, 2019). Pilots must independently interpret and apply the weather information from these sites to their planned flight. The remaining weather self-briefing tools can be considered forms of *structured self-briefing*.

Commercially available applications such as Foreflight, as well as websites like 1800wxbrief.com (Leidos), provide pilots with varying levels of assistance in contrast to freely browsing weather products/information.

Assisted Briefings vs. Self-Briefings

According to Duke et al. (2019), GA pilots in the continental U.S. use FSS less frequently than in years prior. In 2018, 40% of pilots used FSS as their initial weather resource, but only 37% reported using it in 2019. While pilots are reporting less FSS usage, this does *not* mean that pilots never use FSS. Only about 13% of all respondents in 2019 reported not contacting FSS. This is likely because that, while the trend toward the use of aviation software applications is increasing, many pilots report using FSS to check weather information immediately prior to flight. Of those that did contact FSS, about 51% always conducted self-service planning activities beforehand.

Although instructions for obtaining a briefing from a flight service specialist are well-documented and consistent, instructions for obtaining a briefing over the internet are less well-documented. There is no law or mandate that specifies how a pilot should conduct a weather briefing. A number of self-briefing tools exist, but there is little direction for how to thoroughly conduct such a brief. Pilots are responsible for ensuring that they understand what weather conditions they might encounter along their route; some briefing tools (i.e., Foreflight) provide greater guidance to walk through the weather than others (e.g., aviationweather.gov).

Current Study

Pilots experience a greater burden of responsibility when they transition from calling Flight Services to self-briefing. They must rely on their own interpretation of aviation weather products in order to make a go/no go decision. While many pilots prefer self-briefing with tools such as Foreflight, it is still unclear why pilots prefer a particular briefing method (Duke et al., 2019). To improve tool and resource design, it is essential to understand how these tools impact pilots.

The purpose of this study was to gain insight into how pilots approach the weather preflight briefing process. To accomplish this, the research team used a qualitative approach to examine pilot perspectives on obtaining a phone-in brief in comparison to self-briefing.

METHOD

Participants

The participants self-selected into the study from a pool of pilots-in-training at a southeastern U.S. university and a pool of pilots within the CONUS flight community. The student group sample included nine pilots on a southeastern United States university campus who were 18 years of age or older. The sample was recruited by the researchers by going to classes, attending student meetings, and asking people in person to participate in the study. The non-student group sample included four GA pilots from the continental United States (CONUS). Pilots in both groups were 18 years of age or older and had a private pilot or commercial pilot rating (with or without instrument ratings). The research team sent emails to the leaders of several pilot clubs/organizations in the United States to recruit.

Apparatus

A prescreening Qualtrics survey was sent to potential participants, allowing interested pilots to opt-in to the study. The focus groups and interviews were held virtually using Zoom video conferencing software. Participants and researchers used their own devices (e.g., computers, laptops, smartphones) to partake in the study. Transcripts were produced using Descript software (Descript, 2021) and verified by researchers for accuracy.

Procedure

Focus Groups

A series of focus groups were used. Each group was scheduled to contain between three and five participants. (In the event that only one or two participants joined the meeting, the format was changed to an interview.) Participants completed the demographics form before joining the meeting on Zoom. Each focus group was hosted by two of the research investigators: one to moderate the focus group and the other to take notes. In order to ensure name confidentiality, the researchers changed each Participant's name to their participant ID number (e.g., P2, P7). The video was on for all participants, but only audio recordings were saved.

The discussion questions were designed to encourage free-form conversations amongst participants and supervised by the moderator. A total of nine questions were scripted prior to the focus groups, and

follow-up questions were asked when appropriate. These questions addressed topics such as reason for briefing method preference, reasons for calling FSS, changes they would make to the preflight weather briefing process, and how information differs between self-briefing and calling-in. After the allotted time elapsed, the moderator debriefed the participants. Then participants were free to leave the study and compensated for their time with a \$25 gift card.

Data Processing and Coding

A research assistant transcribed the audio recordings of all focus group sessions. Next, three separate human factors researchers examined the transcriptions and independently developed code terms to categorize an initial sample of the data. The researchers then discussed and compared their coding methods. After a consensus of code terms was reached, the researchers independently coded all of the transcription data. Table 1 illustrates how the final coded data appeared. The researchers used PivotTables in Microsoft Excel to assess keyword trends within each code category.

Code	Keywords	Quote	ID
Perception of Flight Services	Useful for pilots-in-training	"It is something that I'm going to teach my students how to use certainly, whether they decide to utilize it or not, that's their decision."	P3
Reason for calling	Knowledge able	"They're better at interpreting the weather than I am."	P4
Preferred Method of Briefing	Foreflight	"So as an instructor, I usually just rely on Foreflight or aviation weather center to get all the information that I need because it's easier and quicker."	P9

Table 1. Exampled of coded data spreadsheet with codes, keywords, relevant quotes, and participant ID.

RESULTS

Last Call-In

Sixty-nine percent of participants had not personally called FSS this year despite flying recently. Four participants mentioned that they had not used FSS in one to five years.

Preferred Method of Briefing

Approximately sixty-nine percent of participants preferred Foreflight (a self-briefing tool) over all other briefing methods. All other participants claimed to use a combination of self-briefing and calling FSS.

Reason for Calling

The results revealed a total of 10 reasons that GA pilots call FSS. Table 2 itemizes each reason for calling FSS. First, about fifty-four percent of participants said they would call in if they were about to embark on a cross-country flight. Another reason for calling (as reported by almost fifty percent of participants) was if there was a chance of severe weather in the area, including icing, wind, fronts, thunderstorms, and changing weather conditions. About thirty-one percent of participants only called in when asked to do so by their instructors. Approximately twenty-three percent of participants said that they call in if they are confused by the findings in their self-briefing or to hear the VNR statement from FSS. Only two participants reported each of the following reasons: getting a second opinion about the weather, dangerous or emergency situations, and for inflight weather updates. Finally, one participant reported calling in because they enjoy asking FSS follow-up questions about the weather and alternate routes.

Reason for Calling	%	F
Cross-Country	53.8%	7
Severe Weather	46.2%	6
Asked to by Instructor	30.8%	4

Confused During Self-Briefing	23.1%	3
VNR	23.1%	3
Second Opinion	15.4%	2
Technology Issues	15.4%	2
Dangerous/Emergency Situation	15.4%	2
Inflight	15.4%	2
Ask Questions	7.7%	1

Table 2. Percent and frequency count of participants who stated each reason for calling.

Flight Services

Benefits. Participants described FSS as helpful, reassuring, and very knowledgeable. They also stated that FSS was a great tool for explaining weather plainly to pilots-in-training, obtaining a VNR statement, and checking a secondary weather source.

Challenges. Participants, particularly the younger pilots, stated that FSS spoke too quickly, making it difficult to understand or write down all necessary information. They also commented that the information received from FSS was confusing. Three participants also noted that receiving a phone-in brief was an inefficient way to conduct a weather brief due to the advancements in self-briefing technology. Another participant claimed that the briefing often talks too much when the information could be simplified. Figure 3 illustrates the most common descriptions of FSS.

Figure 2. Most common descriptions of Flight Services with larger sizes indicating greater consensus.

Self-Briefing

Benefits. As most participants preferred using self-briefing tools like Foreflight, they also reported that it was easy to use. Participants also like that the self-briefing process is faster than calling in. Most importantly, participants enjoy seeing the graphs and other information on a screen rather than read over a phone.

Challenges Participants reported several problems with self-briefing. One notable issue was when Foreflight unexpectedly updated. Participants also complained about confusing graphs, legends, and coded weather information. Another reported challenge was the lack of a method to ask questions or follow up on a particular weather product with a live briefer (other than calling FSS).

Perception of Video Conferencing Option

One participant brought up the idea of FSS establishing a video conferencing feature. The researcher's followed up on that idea with six participants in subsequent sessions. Of the six participants asked, four agreed that it would be a useful feature. Many of these participants wanted a "share screen" option so that the briefer could visually display the weather products to the pilot. Of the two that did not want FSS video conferencing, one thought the process would take too long to obtain a brief, and the other preferred self-briefing over FSS.

DISCUSSION AND CONCLUSION

A technology shift is underway in GA. Specifically, GA pilots are moving away from telephone briefings to obtain preflight weather information and toward independently acquiring weather information during a self-briefing. This study examined GA pilots' perspectives on these two approaches.

Similar to the Duke et al., (2019) results, predominantly, participants preferred self-briefing tools (i.e., Foreflight) over calling in to FSS. The stated reasons were the efficiency and ease of use. Despite this preference for self-briefing, the results revealed ten instances that prompt GA pilots call FSS. These include being told to do so by an instructor, encountering severe weather, and embarking on cross-country flights. Overall, the pilots in these focus groups had mixed perceptions of FSS.

Limitations of this study include the smaller sample size and focus group/interview size. Additional data collection is in progress to obtain a sample more

generalizable to the full FA population. This qualitative assessment of briefing methods provided insight into pilot preferences and potential improvements for future briefing technologies. Future directions will include assessing pilot performance when using different briefing methods (e.g., Foreflight and FSS).

DISCLAIMER

The views expressed in this paper are those of the authors and do not necessarily represent the organization with which they are affiliated or the FAA. The authors thank the Weather Technology in the Cockpit Program in the FAA Aviation Weather Division, as well as all of the research participants.

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