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Volunteer Aircrew Member Training Methods:

A Study of the Civil Air Patrol Training System

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Abstract

This study investigates the training practices of volunteer aircrew members used in a search and rescue, disaster relief, or homeland security role. It examines the differences between the legacy training methods of evenings and weekends, concentrated training methods during formal courses, and emerging methods such as online training. Data were derived from an electronic survey, sent via email lists, with a total of 72 volunteers responding. Respondents were qualified aircrew members in the U.S. Air Force Auxiliary, Civil Air Patrol. Pilots, observers, and scanners responded. Results indicated ambivalence with the legacy training methods. Training aircrew members in non-pilot roles should differ based on whether the individual is also a rated pilot. A mixed method of lecture, online training, and flight training gains the most satisfaction from aircrew members. Evening and weekend training is a relatively unalterable factor in volunteer training and must be studied further to maximize effectiveness. Aircrew members are willing to train more using simulators but are ambivalent towards additional online training methods. Members value their training highly and believe it allows them to complete their missions effectively.

Purpose

The purpose of this research is to investigate training practices for volunteer aircrews and determine the optimum method or methods. Using the United States' largest volunteer aircrew population, the Civil Air Patrol, as a sample, conclusions will be drawn from this research that will affect future training efforts and decisions. Specifically, this research will assess the satisfaction with past and present training techniques. Through a survey method, it will predict the areas of emphasis in the future.

Scope

In 1997 the U.S. Air Force Auxiliary, the Civil Air Patrol (CAP), began a momentous undertaking to modernize and standardize training for its members. This program, dubbed the Emergency Services Curriculum Project, is still in progress in its third phase. The program was broken down into ground search and rescue personnel, incident command and mission base personnel, and aircrew personnel. The focus of the research was upon aircrew.

Attention in this area is necessary due to sheer numbers. CAP operates the world's largest fleet—550 aircraft—of single-engine piston general aviation aircraft which are ideal for its missions (CAP 2004). CAP is largely known for its Search and Rescue (SAR) mission, and rightfully so. Every year CAP flies over 95% of the total flight hours as directed by the Air Force Search and Rescue Coordination Center, which is responsible for

aeronautical SAR in the contiguous United States (CAP 2004). Its lesser known missions include support of the Department of Homeland Security (DHS), disaster relief and aerial damage assessment, airborne radiological monitoring, and border reconnaissance. CAP has entered into written agreements with DHS, the American Red Cross, the Federal Emergency Management Agency (FEMA), the Department of the Air Force, and other players across the homeland security and emergency spectrum.

Prior to 1997, the 64,000 member organization conducted its operational missions through a largely non-standardized training system. These systems were haphazardly successful or not dependent upon the individual state and, in some cases, region within the state. The safety of flying operations was never in question; CAP pilots annually submitted themselves to academic testing and a flying evaluation (checkride). This same process continues today with good results; despite the potentially hazardous missions CAP undertakes it maintains an accident rate below that of the remainder of general aviation aircraft. CAP has an accident rate of 3.6 accidents per 100,000 flying hours (Woodsmall 2004) versus general aviation at 6.7 accidents per 100,000 flying hours (Aircraft Owners and Pilots Association 2004).

While CAP aircrews were flying safely, they weren't necessarily flying effectively. The highlight of this research is upon mission training for the entire aircrew, not simply aircraft operation. The criticality of aircraft operation requires it to be the foremost concern as a prerequisite to mission accomplishment. The mission can not be accomplished, however, without proper training.

The Emergency Services Curriculum Project has focused on SAR training for all positions and phases. While SAR is becoming a legacy mission due to the large expansion of additional missions following 9/11, SAR is considered fundamental since the majority of flight hours in CAP are still in the SAR capacity. Becoming qualified as a SAR aircrew member is required as a basic qualification before a member may fly on other missions (with the exception of simple transport missions from one airport to another).

An aircrew is made up of three types of crew members. These types are scanners, observers, and mission pilots. The actual makeup of an aircrew is determined by both the capabilities of the aircraft to be flown as well as the environment in which it will be flown. For example, an aircraft that can carry four people over the plains of Iowa may only safely be able to carry three in the mountains of Colorado. That being said, the nominal makeup of a CAP search aircrew is one of each type. Should aircraft performance allow for additional crewmembers, typically more scanners are added. Occasionally a second mission pilot is added in place of an observer.

Most CAP aircraft have four seats, two in the front and two in the rear. Scanners are typically seated in the rear seats. The scanner is primarily a visual sensor for the aircrew; he or she employs specific scanning techniques to locate the search objective. The scanner is also expected to speak up to aid the rest of the crew for reasons of flight safety or mission accomplishment. It might be easy to lump scanner duties into a trite phrase such as "just look out the window and speak up if you see anything," but this could not be further from the truth. Good visual scanning requires training and discipline. A scanner is not distracted from other duties, and therefore often is the first to see a target. Most importantly, the scanner is an aircrew member whose point of view is unique and whose input should be considered carefully.

The observer typically occupies the front right seat of the aircraft. The observer's duties include visual scanning, much like the scanner, but the observer also is responsible for radio communications with command and control, operation of navigational equipment to include the global positioning system (GPS), operation of electronic direction finding search equipment, and general navigation duties. These duties are on par or surpass those of the mission pilot. In many cases, the observer can perform every task that a pilot can with the exception of actually manipulating the aircraft flight controls.

Because of this complex skill set, many observers are actually Federal Aviation Administration (FAA) pilots who have not completed the required number of flight hours (200 as pilot in command) to become a mission pilot. In many cases, these observers are ideal because they can, for short periods, relieve the mission pilot of the controls. Conversely, the training of non-pilot observers is difficult because the observer position requires nearly the level of knowledge as a pilot. This is in addition to operation of mission-specific equipment such as direction finders, airborne video and photography, or airborne radiological monitoring equipment.

Often the observer is referred to as the "mission commander" and the mission pilot as the "aircraft commander." In many ways, this is true. The observer will often be directive in the operation of the aircraft in order to meet the needs of the mission. When describing this, an intended oversimplification of the mission pilot duties is to simply "drive the airplane." This means the aircraft commander is responsible for adherence to all FAA regulations and internal regulations. It also requires the pilot to be responsible for safety, even if it precludes mission accomplishment. The mission pilot, then, has a veto in the name of flight safety.

The idea that the mission pilot is simply an airplane driver has its merits, and on a strong crew this, in fact, may be the case. In most instances, however, the mission pilot takes a much more active role in achieving the

desired results. This may be due to a variety of reasons, but chief among them is that the pilot is an experienced aviator, and by virtue of the mission pilot qualification, also an experienced searcher.

By default the mission pilot is also a mission instructor. It is the qualified mission pilot who trains scanners and observers to complete their duties successfully, including operation of specialized mission equipment. The ideal role of a mission pilot is to be merely an airplane driver, but most often this is not the case as the mission pilot will often give input to the scanner and observer in how they might do their jobs better. This is true for qualified as well as trainee aircrew members.

This is all possible due to the commonality of tasks in between aircrew member positions. The scanner's skills in visual search are not unique to the rear seat. An observer must be equally skilled in these tasks. Furthermore, training in specialized equipment is conducted in parallel, with the same standard for observers as for mission pilot. Thus, an observer who has already demonstrated proficiency in operating the GPS will not have to re-accomplish that task if she or he later is able to upgrade to mission pilot.

Task-based training with accompanying standards was accepted as the necessary method for CAP in 1997. Advantages of such a system are obvious considering the above. Most important is the standardization across the nation. An observer in Oregon should have the same skill set as an observer in Florida and task standards ensure this is the case. An initial cadre of personnel conducted train-the-trainer sessions which were required to evaluate tasks for certification. More recently, a member qualified in a specialty who is has completed skills evaluator training (SET) may now evaluate tasks.

Scanners and observers who have been evaluated on all the required tasks and completed the experience requirements are then considered qualified. Mission pilots must continue through one additional step, a mission checkride. This final examination is conducted outside of regular skill evaluation channels, and is administered by an experienced mission pilot who has been designated by the top CAP official within a particular state. The mission pilot is the only specialty in CAP requiring such scrutiny. The dynamic nature and potential for risk requires special confidence, and thus special examination, of the mission pilot skills. Skilled and safe pilot skills are the minimum; lapses in either will result in a failed checkride. Mission skills must be demonstrated on top of pilot skills.

Upon implementation of the skills evaluation standard, all members were required to complete the tasks over a phase-in period of two years. This included members who were qualified under the previous system. All members were essentially required to re-qualify under the new system, so all members who are now qualified meet

at least the minimum new standards. This has helped to homogenize and standardize all CAP operational mission personnel.

Some members balked at having to re-qualify in areas they had already completed. This was particularly true for advanced crew members, such as mission pilots, who were now asked to re-qualify beginning at the scanner position. This transition was intended to be as easy on workers as possible, but a positive attitude still was a necessity. Crewmembers were given a long period of time and ample notice to complete the task-based training.

Many crewmembers expressed displeasure at having to complete basic and tasks they considered "lowly." All the tasks were considered necessary, however, to complete a "building block" approach to learning. Even veteran crewmembers were asked to complete the tasks so that they might then be able to teach the tasks to others.

In conjunction with the task based training, the Emergency Services Curriculum project also began work on training materials to be used in teaching the required tasks. These materials included a comprehensive Mission Aircrew Reference Text (MART) and PowerPoint slides. Work on these materials continues. The major revision to be undertaken is applying specific slides and text chapters to specific tasks. Currently the curriculum is intended to be used as a whole to transfer the required knowledge for tasks. It is increasingly clear that some students may not require the full body of academic training due to prior training. For example, an observer student who is also a pilot but is not ready to become a mission pilot does not require training on how to operate aircraft radios, but still requires mission-specific equipment training.

It must be emphasized that many individuals may have not seen the training materials with the exception of the required task lists. The task lists are obviously necessary in upgrading or re-qualifying in a particular specialty, but there is no requirement to use the recommended task guide, slides, or reference text. While this allows for individual flexibility, frequently new members may not be aware that the materials even exist, much less know where to find them. While they are not hidden, considerable individual effort must be undertaken for a newcomer.

The mission pilot checkride is another area that does not match up with the updated task based training. The checkride's required events are listed on a Form 91. The Form 91 has not been reconciled with task-based training. While the basic skills have remained relatively unchanged, the potential exists for the legacy training system to impart an undue influence if this is not accomplished

Training materials by themselves cannot train new aircrew members. As part of the Civil Air Patrol National Emergency Services Academy (NESA), a Mission Aircrew School (MAS) was formed five years ago.

MAS was taught by a cadre of many of the same individuals who wrote the training materials. The MAS is further charged with updating the training materials as new techniques develop and new missions emerge. The goal of MAS is to provide the best quality training to new and experienced aircrew members. New crewmembers return to their home states to tell others how training should be conducted. Experienced members return to teach what they have learned by modeling training after MAS. MAS is intended to be the national standard.

MAS is conducted differently from most other training in Civil Air Patrol. Training spread over long periods of time has been the norm in CAP. MAS concentrates and integrates all of the training within one week's time. This intense period if time is intended to aid retention of the material as well as to provide quality instruction. Furthermore, it provides a critical period of feedback for training improvement.

The Emergency Services Curriculum project is delivered in a variety of ways. The optimum method is MAS and courses following the MAS model. Less desirable is breaking up the MAS model over evenings and weekends. A method needing further investigation is online delivery via the internet. Currently some basic prerequisite courses are delivered only via the internet.

Method

The method used to acquire the data was a simple survey utilizing a short fill-in-the-blank demographics section and 25 Likert-scale questions. A scale of five to one was used, five being "strongly agree" and one being "strongly disagree." This purposely allowed for a neutral "neither agree nor disagree" statement. Some participants were confused by some of the questions because they could be answered by a "yes" or "no." In these cases, answers were transferred to a five or one, respectively. See Attachment 1 for an example of the survey.

The survey was delivered via several email mailing lists. CAP members sign up for these lists voluntarily. The survey was delivered directly to the general CAP talk list, the emergency services issue list, the MAS student and staff participant list, and the South Dakota list. As the email attached to the survey asked, some members forwarded the survey to additional members. Michigan and Vermont members were among those who spread the word throughout their state. Since only email list subscribers were the only members surveyed and there is no method of determining exactly how many possible participants were reached, it is not possible to compute a rate of return.

Motivation must be considered with respect to the participants. First, the members have subscribed to the email list for one reason or another. These reasons may include dedication to the organization or an intense dislike

for it. Discussions on the list are well known for being heated, so a wide range of opinions is likely. The reasons for answering the survey are reasonably equally as diverse. The only way to mitigate this possibly confounding factor is a large sample size.

It must also be highlighted that the Mission Aircrew School staff and past students were asked to participate in this survey. Since MAS is one of the training methods being investigated, at least the instructors are likely to be opinionated in their responses. Former students are likely to have a more independent opinion of the school. It should be additionally noted, however, that many of the current staff members were former students.

The internet delivery was fairly simple for those proficient in the use of email. The intent was for respondents to "edit" the original survey sent out by adding their responses at the end of the survey questions. A few respondents were not able to do this for either technical difficulties or for lack of ability. These respondents in question queried the researcher with the problems. In all cases the problem was solved by attaching the original survey as a Microsoft Word document. The respondents were then able to edit and return the survey.

The original survey was submitted to agents trusted by the researcher for editing. In accordance with their recommendations, the survey was pared down to demographics and only 25 research questions. The intent was to provide a reliable and redundant instrument while simultaneously being brief enough to maximize participation. Furthermore, internet training was added as an area of interest.

Participants were asked to identify their sex. This was examined to determine if there was any significant difference in male versus female respondents. Participants were also asked if they were a qualified mission pilot. A qualified mission pilot is current in all tasks and has completed the Form 91 checkride. Next, participants were asked whether or not they were a qualified scanner and/or observer. This provided some measure of redundancy as an individual who reported that they were a qualified mission pilot but not a qualified scanner or observer, then that person is not truthfully a qualified mission pilot. Respondents were also asked if they were a scanner or observer and a FAA pilot, but not a mission pilot. This often happens when a certificated pilot does not yet have enough hours to upgrade to mission pilot and serves in the other crew positions in the meantime. Pilots were asked to provide their FAA certificates and ratings. Next, pilots were asked to provide their number of hours acting as pilot in command (PIC). While often highly correlated to one another, certificates and ratings versus hours are two different methods of measuring experience and skill. A private pilot with 2,000 hours pilot in command is likely an excellent pilot, but in truth she has a different skill set than a 2,000 hour airline transport pilot.

Note that successful training is operationally defined by participant satisfaction. A more objective method of measuring training practices would be testing of knowledge and skills prior to and following each type of training. For purposes of budget and time, satisfaction is utilized in this research.

Each of the instrument questions will now be examined. For purposes of clarity, instrument questions are italicized. The background necessary to interpret these questions, including terms and abbreviations, may be found in the scope section of this article.

1. Overall, I am satisfied with the way aircrew training is conducted in CAP. This question is intended to gauge the overall satisfaction of participants with the training methods currently in place. It may also be an indicator of the overall attitude of the respondent. A highly negative response might also be indicative of a negative attitude.

2. Classroom lecture is effective for CAP aircrew training. This question is intended to measure the satisfaction of participants with the classroom environment. It does not differentiate between various levels of instructor knowledge and teaching ability.

3. Online training (presentations followed by a short test) is a good replacement for classroom training. This question asks the participant to directly compare the group classroom to individual online training.

4. Online training would be better than classroom training in my home wing. This question attempts to measure the satisfaction of home state (wing) training as compared to nationally standardized online training. It takes into account instructor ability. It must be compared to the answers to questions three and five for a clear picture.

5. Online training would be better than classroom training at the National Emergency Services Academy. This question requires knowledge of the NESA Mission Aircrew School, at least by reputation. A lower response versus that in question four would indicate satisfaction with MAS but not with home state training.

6. Classroom lecture is a waste of time. This question is essentially the inverse of question two. It also does not take into account instructor ability. It also is an attitude check question as a highly negative respondent would likely respond highly negatively to this question.

7. I like classroom training followed by flight training instead of learning everything in the airplane. This training method is the one used at MAS and, in some cases, in legacy training methods. It measures the satisfaction for this practice.

8. A mixture of online training, classroom training, and flight training would be best. This question explores the possibility of a mixed-methods training approach by measuring potential satisfaction. In many ways, however, this is the training method currently in place.

9. I have used CAP online training. This question measures the utilization of current online training opportunities. While current opportunities are small, a high degree of usage would indicate a strong possibility of growth in the future.

10. More online training than is currently used would be better. This question asks how participants would be satisfied if an increased emphasis on online training was used.

11. My home state conducts training in a concentrated format (three days in a row or longer). This question is to ascertain whether or not MAS-style training is occurring in individual states. This question was one commonly answered "yes" or "no," whereas the intent was for "strongly agree" to mean a great deal of concentrated training, and "strongly disagree" to mean none at all.

12. My home state conducts training spread over weekends and evenings. This question measures to what extent the legacy training method remains in use.

13. Training spread over weekends and evenings is sufficient. This question measures satisfaction with the legacy training method.

14. Instructors in my home state are able to teach me to the required standards. The required standards in question are the tasks, with criteria as described in the task guide. This question measures the quality of present instructors in CAP.

15. Instructors in my home state use at least some of the National Curriculum (textbook and / or slides). This question necessitates knowledge of the National Curriculum, and measures the extent of its use.

16. I am satisfied with the National Curriculum (textbook and slides). This question measures the satisfaction of the standardized training materials. It requires knowledge and use of the training materials.

17. Three sorties are adequate to complete mission pilot or scanner / observer training. This question measures the satisfaction with the current dual requirement in aircrew training, both tasks and sorties (flights). Currently trainees are expected to complete all the required tasks and get several flights for experience and practice that cannot be measured by the tasks alone. The sortie requirement needs investigation to see if it should be raised, lowered, or left alone.

18. *My instructors focus on completing the required tasks, not just getting the required number of sorties.* This question measures the cooperation of instructors as they apply the task-based training system. It also relates to the previous question and the sortie requirement.

19. *Online training and simulators can replace some, but definitely not all, hands-on training.* As computer based training and internet delivery improve, some training might be able to be replaced with simulators. Already individuals use GPS simulators to learn operation of the complex menu environment. Proficiency with these part-task trainers could replace some flight experience, and at a much cheaper price. This question measures the satisfaction with that possibility.

20. *My aircrew training allows me to perform missions better than untrained personnel.* This question measures whether or not individuals value CAP training. If there is significant dissatisfaction with CAP training, perhaps individuals believe they could accomplish the mission with no training at all.

21. *I would not have been able to accomplish CAP missions without training.* This question is similar to the previous question and is asked for redundancy and reliability purposes. It requires a careful read due to the double-negative (not, without). It is more absolute than the previous question; rather than shades of "better than untrained personnel" it asks if missions would be possible without training.

22. *(Mission Pilots Only) The Form 91 checkride process adequately and fairly examined my skills.* This question only applies to mission pilots. Since mission pilots require the checkride as part of qualification, the process must be examined. This question measures the satisfaction with the impartiality of the examiner as well as the depth of the examination. As a culmination of training, individuals wish to be challenged enough to excel during a checkride. This question is also measure of that challenge.

23. *(Mission Pilots Only) My Form 91 check pilot adhered to skill standards.* This question, for mission pilots only, pertains to the mismatch in the Form 91 checkride requirements and the task-based training system. The task-based system takes precedence, but this currently only is tempered with the judgment of the examiner. This question measures the satisfaction of mission pilots as to the application of the task-based system on their checkrides.

24. *(Mission Pilots Only) My training adequately prepared me for my Form 91 checkride.* This is an overall satisfaction question, similar and redundant to the first question in the survey. It measures a mission pilot's satisfaction of his or her training as compared to the rigors of the checkride.

25. I have answered this questionnaire truthfully and to the best of my ability. This question asks the

participant to measure his or her own reliability. A response less than five would tend to indicate that the motivation

for completing the survey has waned or might indicate that the survey was completed with other than honorable

intentions.

<div align="center">Results</div>

72 individuals responded to this survey with meaningful results. Replies came in many varied formats, to

include simple email replies, editing of the survey document, scanning handwritten results, and even one mailed

reply delivered by U.S. Postal Service.

Of the 72 participants, only nine were female. Of these females, none were mission pilots, but two were

certificated FAA pilots. While the 63:9 ratio seems accurate for the overall population of the Civil Air Patrol, zero

female mission pilots certainly is not representative. To test this accurately, a much larger sample would need to be

obtained. A sampling directed at female members would be an acceptable method for future research efforts. See

Figure 1.

<div align="center">**Figure 1.**</div>

The qualification background of the respondents was widely varied. Slightly more than half (39 of 72) of

were mission pilots with the remainder (33) being observers and scanners. While the qualifications of observers and

scanners are significantly different, they were considered interchangeable for purposes of simplicity in this study.

Of the observers and scanners, 14 were also certificated FAA pilots but not mission pilots. This number included 2

pilots who were certificated in gliders but not in powered aircraft. 19 observer/scanner respondents were not FAA

rated pilots. See Figure 2.

Figure 2.
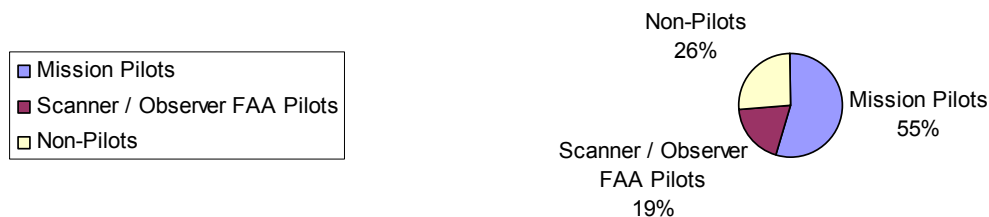
Other demographic factors such as age and location were not measured. For those who were certificated pilots, the hours of pilot in command (PIC) were recorded and analyzed, but no significant findings came from these numbers. For reference, the instrument questions are restated in Figure 3. The mean of PIC hours as well as the mean, standard deviation, and difference from the group mean can be viewed in Figure 4. Combining the instrument questions of Figure 3 with the reduced data in Figure 4 will clarify the following discussion.

Figure 3.

(question not numbered) Pilot In Command Hours, PIC
1. Overall, I am satisfied with the way aircrew training is conducted in CAP.
2. Classroom lecture is effective for CAP aircrew training.
3. Online training (presentations followed by a short test) is a good replacement for classroom training.
4. Online training would be better than classroom training in my home wing.
5. Online training would be better than classroom training at the National Emergency Services Academy.
6. Classroom lecture is a waste of time.
7. I like classroom training followed by flight training instead of learning everything in the airplane.
8. A mixture of online training, classroom training, and flight training would be best.
9. I have used CAP online training.
10. More online training than is currently used would be better.
11. My home state conducts training in a concentrated format (three days in a row or longer).
12. My home state conducts training spread over weekends and evenings.
13. Training spread over weekends and evenings is sufficient.
14. Instructors in my home state are able to teach me to the required standards.
15. Instructors in my home state use at least some of the National Curriculum (textbook and / or slides).
16. I am satisfied with the National Curriculum (textbook and slides).
17. Three sorties are adequate to complete mission pilot or scanner / observer training.
18. My instructors focus on completing the required tasks, not just getting the required number of sorties.
19. Online training and simulators can replace some, but definitely not all, hands-on training.
20. My aircrew training allows me perform missions better than untrained personnel.
21. I would not have been able to accomplish CAP missions without training.
22. (Mission Pilots Only) The Form 91 checkride process adequately and fairly examined my skills.
23. (Mission Pilots Only) My Form 91 check pilot adhered to skill standards.
24. (Mission Pilots Only) My training adequately prepared me for my Form 91 checkride.
25. I have answered this questionnaire truthfully and to the best of my ability.

Figure 4.

QUESTION	ALL		MISSION PILOTS			SCANNERS/OBSERVERS			PILOT SCAN/OBS			NON-PILOTS		
	MEAN	STD DEV	MEAN	STD DEV	DIF	MEAN	STD DEV	DIF	MEAN	STD DEV	DIF	MEAN	STD DEV	DIF
PIC	1739	x	2058	x	x	X	x		780	x	x	x	x	x
1	3.042	1.14	3.05	1.12	0.0	3.03	1.15	0.0	**2.29**	0.93	**0.8**	**3.58**	0.97	**0.5**
2	3.694	1.00	3.74	0.97	0.0	3.64	1.02	0.1	3.50	1.02	0.2	3.74	0.99	0.0
3	2.931	1.20	2.95	1.16	0.0	2.91	1.22	0.0	3.21	1.22	0.3	2.68	1.14	0.2
4	2.722	1.35	2.79	1.31	0.1	2.64	1.37	0.1	2.79	1.42	0.1	2.53	1.28	0.2
5	2.179	1.22	2.27	1.23	0.1	2.07	1.19	0.1	2.00	1.15	0.2	2.11	1.18	0.1
6	1.536	**0.87**	1.50	0.92	0.0	1.58	**0.81**	0.0	1.57	**0.87**	0.0	1.58	**0.73**	0.0
7	4.569	**0.74**	4.72	**0.59**	0.1	4.39	**0.84**	0.2	4.43	0.95	0.1	4.37	**0.72**	0.2
8	4.535	**0.76**	4.50	**0.81**	0.0	4.58	**0.69**	0.0	4.50	**0.80**	0.0	4.63	**0.57**	0.1
9	4.732	**0.76**	4.87	**0.33**	0.1	4.56	1.04	0.2	4.85	**0.51**	0.1	4.37	1.23	0.4
10	3.833	1.11	3.72	1.05	0.1	3.97	1.15	0.1	3.86	1.36	0.0	4.05	0.92	0.2
11	2.057	1.33	1.84	1.18	0.2	2.30	1.42	0.2	2.29	1.48	0.2	2.32	1.34	0.3
12	3.743	1.19	3.65	1.34	0.1	3.85	0.97	0.1	3.64	0.94	0.1	4.00	0.95	0.3
13	3.306	1.00	3.31	1.05	0.0	3.30	0.92	0.0	3.43	0.95	0.1	3.21	**0.87**	0.1
14	3.778	1.06	3.56	1.16	0.2	4.03	**0.86**	0.3	4.07	**0.85**	0.3	4.00	**0.84**	0.2
15	3.930	1.06	3.95	1.02	0.0	3.91	1.08	0.0	3.86	1.20	0.1	3.94	0.94	0.0
16	3.557	1.12	3.53	1.13	0.0	3.59	1.10	0.0	3.29	1.18	0.3	3.83	0.93	0.3
17	3.169	1.25	3.18	1.26	0.0	3.16	1.21	0.0	3.36	1.30	0.2	3.00	1.08	0.2
18	3.778	0.94	3.62	0.91	0.2	3.97	0.92	0.2	3.64	1.01	0.1	4.21	**0.75**	**0.4**
19	4.333	1.02	4.31	1.08	0.0	4.36	0.93	0.0	4.36	1.07	0.0	4.37	**0.79**	0.0
20	4.676	**0.64**	4.74	**0.70**	0.1	4.61	**0.54**	0.1	4.57	**0.48**	0.1	4.63	**0.57**	0.0
21	4.357	1.04	4.36	1.11	0.0	4.35	0.92	0.0	4.15	1.06	0.2	4.50	**0.74**	0.1
22	4.132	1.04	4.13	1.04	0.0	X	x	x	x	x	x	x	x	x
23	4.289	0.93	4.29	0.93	0.0	X	x	x	x	x	x	x	x	x
24	4.053	1.11	4.05	1.11	0.0	X	x	x	x	x	x	x	x	x
25	5.000	**0.00**	5.00	**0.00**	0.0	5.00	**0.00**	0.0	5.00	**0.00**	0.0	5.00	**0.00**	0.0

For Figure 4, note that DIF indicates the absolute difference between the sub-group mean and the overall group mean. Blue formatting indicates data of interest, a significant change.

With respect to training, the overall satisfaction level of the participants was very close to neutral. On the surface this would seem to indicate neither satisfaction nor dissatisfaction with the current training practices. However, by definition if individuals are not satisfied, then they are dissatisfied. The standard deviation was not significant in this area, meaning that respondents who indicated their satisfaction or dissatisfaction did not do so strongly. It can be concluded that the training system as it exists today is not entirely broken. It can be equally concluded that there is significant room for improvement.

Within sub area groups, however, this was not the case. Mission pilots fell right at the mean at a neutral response. Scanners and observers who were FAA pilots but not mission pilots, however, indicated strong dissatisfaction with the current training system. This was reported with a relatively tight (less than one) standard deviation.

Interestingly, non-pilot scanner/observers indicated slight satisfaction with the current training system also with a relatively tight standard deviation. The difference between these two groups is significant.

The difference might relate to the fact that scanner and observer training is geared towards non-pilots. The training does not take into account previous aviation experience. Members who are already pilots may feel that they are required to spend time learning basic aviation skills that they already know. This would include such skills as aerial navigation and operation of aircraft radios. Thus the training of scanners and observers who are already pilots must be judiciously tailored to the individual.

Participants indicated that classroom lecture is an effective training tool in CAP, but not strongly. It was possible that participants might feel that classroom lecture was often conducted poorly and therefore of limited value. The results indicate to the contrary, however. Because the mean does not strongly agree with the value of classroom lecture, instructors should ensure they are presenting the highest quality lectures possible. Instructors should also consider limiting lecture to only those subjects that require it.

In a later question, participants were asked if they believed that classroom lecture was a waste of time. They very strongly disagreed with a tight standard deviation. This again indicates that classroom lecture is of some value. Taken together, classroom lecture is not the most effective method of training, but neither can its value be ignored.

Survey participants very strongly indicated, with a tight standard deviation, that they were satisfied with classroom training when it was followed by flight training. A similar question asked if the best method of training is to mix online, classroom, and flight training yielded very similar strong agreement. It can be clearly concluded from this that the satisfaction level greatly increases when lessons learned on the ground can be reaffirmed in the aircraft. With each mean above a 4.5 in agreement, Civil Air Patrol would do well to maximize these types of training opportunities.

Respondents very strongly agreed, with tight standard deviation, that they have used online training in the past. Respondents very slightly disagreed, however, that online training can replace classroom training. They

slightly more strongly disagreed, however, that online training would be better than classroom training within their home states. Third, respondents indicated flatly that more online training would be better. These three responses indicate that online training should not replace classroom training in general, but that additional online training would be accepted. If additional online training were implemented to replace some classroom instruction, it must be of a very high quality to offset this apprehension. The numbers indicate that members would readily accept additional online training if it were on a topic not readily taught in the classroom.

In contrast, respondents flatly disagreed that online training would be better than the training at the Mission Aircrew School. This indicates that the school has a good reputation and that its training is well regarded, at least enough that online training can not replace it.

With respect to hands-on training, respondents strongly indicated that a combination of online training and simulators can be used as a moderate replacement. Respondents indicated that certainly not all hands-on training can be replaced by simulators, but that some of it could be. This area is worthy of further investigation, particularly since the cost of operating a personal computer based simulator is nil with respect to flying. The difficulty and expense of online simulators rests in development of the software. If this difficulty can be overcome, significant cost savings will accrue. A further benefit of reducing the required flight time is safety. It clearly goes without saying that a simulator accident has a much lower probability of damaging equipment or harming personnel than does an aircraft accident.

By a flat disagreement with moderate variability, states are generally not conducting concentrated aircrew training of three days or longer. A fairly flat answer with slightly less variability is that states are continuing to conduct training over evenings and weekends. The intent was to see if states were conducting training based on the MAS model in a concentrated format. This does not appear to be the case in most states. The legacy method of evenings and weekends appears unalterable. This stands to reason as these are the times which most volunteers are available.

This is troubling because respondents only slightly agreed that training on evenings and weekends is sufficient. With the intent of improving training, improvement must be made in these evening and weekend sessions.

Overall respondents agreed that their instructors were able to teach them to the required task-based standards. Of significance is that scanners and observers indicated strongly and with tight variation their satisfaction

of instruction to the standards. One the other hand, mission pilots still agreed that their instructors were able to teach them to the standards, but significantly less strongly and with wider variation. This indicates that instructors are having greater success with observers and scanners than with mission pilots. As such, emphasis must be placed on the quality of instruction given to new mission pilots.

Respondents strongly indicate that instructors in their home states are using at least part of the national standardized curriculum. This is encouraging since it is not mandatory to use these materials to teach the task-based skills. Less encouraging, but still good, is the fact that the respondents indicated only moderate satisfaction with the textbook and slides. It would be effort well spent to determine the factors that would increase satisfaction in this area.

Survey participants only slightly agreed, with moderately high variability, that three sorties (flights) are sufficient to complete scanner and observer training. Among the sub groups, mission pilots very slightly more strongly thought that three sorties were sufficient. Observers and scanners who were also FAA pilots more strongly believed this was the case. Significantly different, however, were the non-pilot scanners and observers. They were flatly neutral with moderate variability that three sorties were enough. This indicates yet again that training must be tailored to the individual, particularly so in the case of pilot and non-pilot scanner and observer trainees. Some non-pilot trainees may be ready in the allotted number of sorties, some may require more. Some trainees who are FAA pilots may be ready in less. In either case, a flexible system to allow for these differences should be implemented.

Encouraging on this point is the differing views between pilots and non-pilots, regardless of crew position, on the point of sorties versus tasks. Non-pilots indicate strongly with tight variation that their instructors focus on the required tasks, not on the number of sorties required. Both mission pilots and observer/scanners still agree almost exactly that their instructors focus on tasks versus sorties, but not nearly as strongly and with increased variability. Yet again this indicates a need for tailored training, particularly across the pilot/non-pilot boundary. It also indicates a small amount of dissatisfaction in rated pilots that they are required to fly a specified number of sorties prior to becoming qualified scanners or observers. Regardless, it is beneficial to know that the emphasis is already on the required tasks versus sorties. It appears that the training system only be changed to reflect this prevalent attitude.

The strongest responses on the survey were those concerning trained versus untrained personnel. Survey participants very strongly agreed, with very tight variability, that aircrew training allowed them to complete

missions better than untrained people. Conversely, a nearly as strong response indicated that participants would not have been able to perform CAP missions if they had not received any training. Both of these results are a strong refute to the sometimes vocal opinion that any pilot can complete CAP-type missions. Some communities will contract with a local airplane operator should the need for a small airplane arise. This is particularly true in search and rescue situations. Clearly individuals who have been trained do not believe a situation such as this is acceptable.

Across the board mission pilots flatly agreed, with moderate variability, that the Form 91 checkride process was fair, an adequate examination of skills, and adhered to task standards. Mission pilots equally agreed that their training adequately prepared them for the checkride. This indicates that mission pilots are generally satisfied with the checkride process, in spite of it not adhering to the task-based training system.

Lastly, respondents indicated with certainty that they had answered the questionnaire truthfully and to the best or their abilities. This is a strong indicator of solid validity in the individual responses, and lends itself to an indication of the reliability amongst responses.

<div align="center">Recommendations</div>

Future research in this area could be improved in many ways. This study had a very wide and general scope. This was intentional for maximum research value with a minimum of difficulty. Research could easily be focused on one or more of the sub-areas that are highlighted in the results section.

Of particular interest in future research would be methods of improving evening and weekend training sessions. Because evenings and weekends are a limiting factor in training, emphasis should be placed on how to maximize learning and experience within these constraints. Since the mixed method of training was identified as the most satisfying, future research could determine exactly what mixture is the most effective.

Direct comparison of concentrated training versus evenings and weekends would be equally interesting. This could be done with a similar method and instrument, or be based on the performance of graduates of each type of program. If the merits of concentrated training were strong enough, it could be made mandatory. More likely, however, if the advantages of concentrated training are highlighted, more states would expand the concentrated training format.

One method that may improve training completed during evenings and weekends is a flight syllabus. Currently the task guide lays out specific items that must be accomplished, but gives no suggestion on how to do so.

A syllabus can integrate training into a coherent picture for both the trainee and the instructor. Future efforts should develop the best possible flight syllabus.

Development of improved online training methods and simulators should also be researched. Development should take into account low bandwidth users who use dialup accounts. Low bandwidth, high quality materials would be a challenge, but certainly feasible.

A better study would include a random sample of participants based on lists of qualified Air Force Auxiliary members. A sampling aimed at being more representative of the remainder of the population would yield higher quality results. While the sample received in this research was sizable, obviously a larger sample would be better for future research.

A better instrument can easily be envisioned. In addition to being more focused, future research should be more specific when necessary. It can also give examples to clarify questions. For example, it is believed that some respondents were not at all familiar with the Emergency Services Curriculum project because they declined to answer questions relating to those materials. Along those lines, individuals should be given an "I don't know" option on future surveys that may include relatively new material and procedures.

A better delivery method would have enhanced this research, and would do so for future research as well. While the internet is ideal for reaching many individuals in a very short period of time, some respondents did not possess the internet skills to complete the survey as intended. Furthermore, this led to a wide variety of methods of response. An ideal survey would use an internet web site where participants are limited in their response. Such a survey could easily stack data for analysis and interpretation. The method used in this survey involved manual transcription from the returned survey to a format that could be analyzed. This method is much more prone to error than a digital copy.

Further research should also include more subjective looks at topics. Several participants elected to give unsolicited comments which were useful in thinking about this topic. Participants seem to be readily talkative on this topic and would likely share a great deal of subjective outlooks. Correlating such data can be very difficult in a quantitative study, but a more qualitative study could easily take into account such information.

Conclusions

The overall satisfaction level of respondents was not as negative as expected, but neither was it positive. This means that the current system is not bad, but can stand significant improvement. This research may be considered a first step in the path of improvement.

Non-pilots and certificated pilots should be treated differently in the training system. Each must be able to perform the same tasks, but the emphasis for certificated pilots need only be on the mission-specific tasks. Training must be tailored to the individual based upon experience. It would be logical to establish a program that allows an individual with considerable experience to be waived on some of the sortie requirements. Individuals would still need to complete all of the tasks in the task-based training system, but based on prior aeronautical knowledge could advance more quickly. Concurrence with a state official, perhaps the wing emergency services officer, would need to apply. Such a system would allow instructors to tailor their training to the individual while still maintaining a high quality training system with appropriate checks and balances.

It is important to realize that the mixed method of training received the highest level of satisfaction from the participants. With this in mind, states should attempt to make training activities a mixture of classroom, online, and flight training. In attempting to incorporate this into the weekend schedule, perhaps states could conduct a one or two hour lecture on a new or piece of equipment, practice on an online simulator, and then go fly a mission with that equipment. Such methods allow for appropriate repetition and retention, some of the critical aspects in learning.

Members are not impressed with online training currently in use. If high quality online training materials can be developed, particularly if they apply directly to required tasks, this level of satisfaction would probably rise. Members seem excited about the idea of simulators, however, and that aspect should be exploited.

Lastly, it is critical that members strongly shared that they value their training. A widespread and firm belief that training is necessary means that there is also motivation to get trained. Furthermore, it should be emphasized outside the organization that untrained personnel should not be attempting to fly search and rescue or other potentially dangerous missions without appropriate training.

In conclusion, many directions for the future of Civil Air Patrol training were highlighted. While this study was large in scope, it was still able to make a few specific recommendations that can be implemented immediately. What cannot happen soon should be the subject of further research.

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Attachment 1

Aircrew Training Survey

Thank you for you choosing to complete this survey! By answering the questions below, you authorize and consent the researcher to use the information for classroom purposes and to improve training. Additionally, you understand that your privacy will be protected and your name will not be connected with the results.

Demographics:
Male / Female:
Qualified Mission Pilot: Y / N
Qualified Scanner / Observer Y / N
Scanner / Observer Qualified, NOT mission pilot qualified, but FAA pilot: Y / N
Pilots: Certificates / Ratings:
Pilots: Hours PIC:

Answer the questions below along the following 5 to 1 scale.

5	4	3	2	1
STRONGLY AGREE	SLIGHTLY AGREE	NEITHER AGREE NOR DISAGREE	SLIGHTLY DISAGREE	STRONGLY DISAGREE

1. Overall, I am satisfied with the way aircrew training is conducted in CAP.
2. Classroom lecture is effective for CAP aircrew training.
3. Online training (presentations followed by a short test) is a good replacement for classroom training.
4. Online training would be better than classroom training in my home wing.
5. Online training would be better than classroom training at the National Emergency Services Academy.
6. Classroom lecture is a waste of time.
7. I like classroom training followed by flight training instead of learning everything in the airplane.
8. A mixture of online training, classroom training, and flight training would be best.
9. I have used CAP online training.
10. More online training than is currently used would be better.
11. My home state conducts training in a concentrated format (three days in a row or longer).
12. My home state conducts training spread over weekends and evenings.
13. Training spread over weekends and evenings is sufficient.
14. Instructors in my home state are able to teach me to the required standards.
15. Instructors in my home state use at least some of the National Curriculum (textbook and / or slides).
16. I am satisfied with the National Curriculum (textbook and slides).
17. Three sorties are adequate to complete mission pilot or scanner / observer training.
18. My instructors focus on completing the required tasks, not just getting the required number of sorties.
19. Online training and simulators can replace some, but definitely not all, hands-on training.
20. My aircrew training allows me perform missions better than untrained personnel.
21. I would not have been able to accomplish CAP missions without training.
22. (Mission Pilots Only) The Form 91 checkride process adequately and fairly examined my skills.
23. (Mission Pilots Only) My Form 91 check pilot adhered to skill standards.
24. (Mission Pilots Only) My training adequately prepared me for my Form 91 checkride.
25. I have answered this questionnaire truthfully and to the best of my ability.