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Safety Culture in a Collegiate Flight Training Program

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A common goal within any flight training program is to achieve the highest level of operational safety that results in the reduction of incidents or accidents that can lead to schedule disruption, property damage, or worse. Utah Valley University (UVU) is continuing its research into the application of recommended practices to create a sustainable safety culture. It has concluded the initial phase and has shared survey results and recommendations both internally and externally. UVU wants to continue sharing its experience to help other flight departments achieve an effective safety culture using simple, proven techniques. Part 1 reviews the definition, application, and importance of an integrated, effective, and sustainable safety culture within a flight training department. Part 2 of this article progressed into a completed group discussion that involved a real-world scenario related to safety culture challenges discovered during UVUs first phase of research findings. The group discussion used a safety culture checklist to determine cause(s) and then to recommend actions to be taken to mitigate risk or resolve observed problems.

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Part 1: What is Safety Culture?

Definitions of safety culture abound and most fall short of providing an effective and deployable process by which safety culture can be defined, developed, and implemented by a collegiate-level flight training program. In general terms, we all know what culture represents just as we all know what safety means. Rather than getting hung up on definitions, let us focus on recognizing deficiencies and identifying some strategies for enhancing safety culture.

How people within an organization behave and why they behave as they do is one way of identifying culture, and that behavior starts at the top. Leadership should exemplify the attributes of a strong safety culture, but to do so, they must understand the risks of not appreciating how safety culture, or lack thereof, can both positively and negatively impact the overall demeanor of the organization related to safety as a whole. In any organization, it is not unusual for upper management to have little or no background in the primary operations of the company. How many airline CEOs are pilots, and how many university administrators have any experience with flight training? Effective leaders recognize and defer to the expertise of those in the organization who were hired primarily because of that expertise. While not being personally familiar with the risks, they must accept the assessment of the experts below them and understand that those risks have been carefully evaluated by those best equipped to do so.

An example of this leadership challenge is a flight department wishing to paint its aircraft in high visibility colors to contrast against the local terrain, but leadership insisting on the use of school colors that actually blend with the local terrain, making the training aircraft difficult to see within an already crowded airspace. Subject matter experts in safety must have the moral courage to help educate leadership so that safety is never compromised, best practices in safety culture are aligned, and safety actions are aligned.

Creating an Effective Safety Culture

One of the primary findings from our initial internal survey on safety culture can be summarized by the concept of Systems Thinking (Ackoff, 1994). Systems thinking recognizes that no one function operates in a vacuum. Our survey confirmed the perceived tensions between departments within the UVU School of Aviation Sciences, allowing us to take action to address those tensions. As a result of our actions, departments are working together more smoothly, and safety has been enhanced. Our current safety initiative also involves the increasingly congested airspace in which our operations take place. There are several functions involved in that issue, not just UVU flight training operations. Airspace congestion in the area is the result of increased activity by airline and corporate operations as well as flight schools outside of UVU. Air Traffic Control staffing shortages are also contributing to the hazards. To fully address the issue, all functions that make up the system must be considered.

While this is not a discussion of our Safety Management System (SMS), the SMS played a vital role in identifying the issues with congested airspace and initiating a response. One of the primary tenets of safety culture is effective two-way communication. The safety reporting aspect of our SMS is one of the communication links between pilots, the functional units within flight operations as a whole, and leadership. Based on the number of reports citing traffic conflicts, it

was identified as a serious safety concern, and a comprehensive response was initiated. That response was then communicated back down to those affected by it in a timely fashion. UVU initiated a group discussion amongst each of the impacted flight schools operating within the same airspaces as the UVU flight program. The outcome was positive, with each flight school participating in the meeting, agreeing to UVU's approach, adopting airspace designations, and agreeing to radio protocols for ingress, operations within, and egress from the flight training airspaces. This was an enabler to create a safety culture not only within the UVU flight program but existentially towards and within the other Part 61 flight training programs UVU shares airspace with.

Checklist to Creating a Safety Culture

Creating an effective safety culture and gaining the highest level of operational safety in a pilot flight training program is critical to ensure the safety of all individuals within a collegiate aviation program, including students, instructors, and staff. When faced with a flight operations problem in a collegiate aviation program, it is recommended to utilize a checklist of aviation best practices and principles that are widely recognized in the aviation sector to achieve, maintain, and strengthen a program's safety culture. UVU not only used aviation industry best practices and principles but also general aviation knowledge when it developed a safety checklist to address flight operational safety concerns. The safety checklist developed to create an effective safety culture at UVU incorporates a compilation of aviation general knowledge, established fundamental safety principles and guidelines used in the aviation industry, and best practices outlined in a safety management system, such as safety reporting, safety risk assessment, and safety promotion. In achieving an effective safety culture, UVU has identified the following seven areas in its checklist: 1) Identify the safety concern; 2) Immediate response and communication; 3) Investigation and risk assessment; 4) External resources and involve stakeholders; 5) Identify and implement safety measures; 6) Enhance Safety Management System; and 7) Continuous improvement (International Civil Aviation Organization (ICAO), 2018; Federal Aviation Administration (FAA), n.d.).

Creating an effective safety culture first requires identifying safety-related concerns. Identifying safety concerns involves first observing the safety concern, then clearly defining the operational problem or safety issue and gathering all relevant information. Immediate response and communication involve prioritizing safety and taking immediate action to mitigate issues determined to be imminent risks. This involves having open channels of communication to notify internal stakeholders, including students, instructors, functional units, ex. Aircraft Maintenance Department, and management of safety-related concerns. The next step involves safety investigation and risk assessment. Having a team or a designated individual to investigate the root cause is necessary for establishing an effective safety culture. Determining a root cause requires gathering and documenting findings, interviews, and evidence. This can be translated into a variety of techniques associated with root cause analysis. The best one to use is up to the organization, but having one is an absolute necessity. Establishing a tool and consistently using the tool can shape how people think and behave so individuals can more productively participate in the process. These could take the shape of a fishbone, Venn, and any variety of tools so that the process is visualized and critical discussion can be had. Once all pertinent information has been documented, a risk assessment to evaluate the associated risks' probability of recurring and

the severity of the safety issue can be completed. After completing the initial risk assessment, additional steps are necessary to identify the potential consequences of the problem and then recommend solutions that either resolve or mitigate that risk item. Guidance and collaboration with external safety organizations, stakeholders, and regulatory authorities will identify additional recommendations and best practices to address the underlying safety concern. The next step involves identifying and implementing safety measures and providing training and education. Once the risk assessment has been completed, immediate safety measures should be implemented to address the identified risks. Additionally, a list of corrective actions should be developed and prioritized collectively by all stakeholders to address the safety concerns. Lastly, providing training and retraining will ensure all stakeholders are aware of the safety procedures to address the safety issue. The steps listed provide an initial framework to create an effective safety culture to correct safety-related concerns and to develop a proactive mindset within the entire organization. However, just as important in creating an effective safety culture is developing and maintaining an SMS and striving for continuous improvement within the operation (ICAO, FAA).

Having an SMS in place is an integral part of creating a safety culture within a collegiate aviation program. An SMS is a structured and proactive approach to managing safety and risk within an aviation training program. It is designed to identify, assess, and mitigate safety hazards and risks. Furthermore, it fosters strong leadership and advocates for a safety-first mindset. It includes a set of policies, procedures, and practices that help ensure the safety of both flight and aircraft maintenance operations. According to the Federal Aviation Administration (FAA), an SMS includes four components that consist of: 1) Safety policy, 2) Safety risk management, 3) Safety assurance, and 4) Safety promotion. Safety policy establishes an organization's commitment to safety. It outlines objectives, individual roles, and responsibilities within an organization. Safety risk management identifies hazards and assesses the associated risks. Strategic methods to mitigate or eliminate risk can then be developed. Safety assurance is the third component and provides continuous monitoring of safety performance through safety audits and data analysis. Finally, safety promotion encourages a safety culture through continuous training, awareness, and communication. Creating and maintaining a strong safety culture is an ongoing process of continuous improvement. It requires dedication to prioritizing safety, resilience, and an active involvement of all stakeholders (FAA; Air Safety Support International, n.d. (ASSI)).

Part 2: Traffic Conflicts Safety Scenario

Ensuring safety in and around airports is of paramount importance. UVU's main base flight operations are conducted out of the Provo Municipal Airport (PVU). In the case of the Provo Municipal Airport, safety reports submitted last year through UVU's AIMS reporting system identified a safety concern related to traffic conflicts in and in the vicinity of the Provo airport. This paper will discuss the steps taken by UVU to address the traffic conflicts by utilizing a safety checklist to improve safety measures in the area. The safety concern of traffic conflicts arises from a combination of factors, including the operations in congested airspace, multiple flight schools with varying procedures operating in the same area, limited available airspace due to terrain, and the proximity of Spanish Fork (SPK), a non-towered airport, to that of the Provo Municipal Airport.

Step 1: Identifying the Safety Concern

The first step in addressing the safety concern was to identify it as an opportunity that needed to be addressed. Reports and observations consistently pointed to traffic congestion and traffic conflicts around the Provo Municipal Airport. This congestion stemmed from several factors, making it essential to address the issue. Contributing factors included congested airspace in the area due to multiple flight schools operating in proximity to PVU airport. Six flight schools operate out of the SPK airfield, while four operate out of PVU. A total of ten flight schools operate between the Spanish Fork and Provo Municipal airports, none of which were adhering to standard operating procedures (SOP) for arriving, departing, and operating in the common practice areas. The area is situated in a valley surrounded by mountainous terrain. The presence of terrain in the area limits the available airspace for arriving and departing aircraft and the use of establishing practice areas for student training. Naturally, the proximity of SPK and the PVU airports leads to potential airspace conflicts.

Step 2: Immediate Response and Communication

Recognizing the urgency of the situation, UVU's safety coordinator initiated immediate responses and communication efforts. A CFI (Certified Flight Instructor) safety meeting and safety standdown were organized to address the traffic conflicts and provide re-training on UVU's Standard Operating Procedures (SOPs) and best practices. This ensured that instructors were well-informed about the existing airspace congestion safety concerns, standard operating procedures, and the importance of adhering to those procedures. UVU's Safety Committee, consisting of managers from respective functional areas within the aviation department, met to discuss the traffic conflicts, solutions, and next steps.

Step 3: Investigation and Risk Assessment

To gain a deeper understanding of the traffic conflict safety required investigating and risk assessment. Additional data was collected through safety reports and technology such as the Virtower airport operations tracking system application. Virtower was utilized to assess and gain a better understanding of traffic congestion at the Provo Airport; see Figure 1. The analysis included data from October 26, 2022, to July 31, 2023. The data provided total operations for certain times of the day and days of the week. Flight training operations accounted for 49.6 percent of all operations (VirtowerTM, n.d.). The information obtained allowed for not only a comprehensive understanding of the extent of the congestion at Provo Airport but also the types of flight operations that were contributing to the congestion.

Step 4: External Resources and Involving Stakeholders

To address the air traffic conflict safety concern effectively, external resources were enlisted, and key stakeholders were engaged. An external safety consultant was hired to conduct a safety threat assessment, providing an objective evaluation of the situation. Furthermore, meetings were organized with external stakeholders, such as representatives from the various flight schools, airport managers for both airports, air traffic control managers from Provo Airport, and other relevant parties. This collaboration was essential in aligning safety goals and

concerns, as well as securing buy-in for the safety threat assessment and its recommendations.

Figure 1
Aircraft Operations Count Analysis, Provo Municipal Airport

Aircraft Operations Count Analysis
Provo Municipal Airport

From:	10/26/2022	**Total Ops:**	96,799	**Annualized:**	127,092
To:	7/31/2023	**Average Day:**	348.2		
Days:	278	**Max Day:**	763		

Day of the Week		
Day	**Ops**	**Percent**
Mon	13,711	14.2
Tue	15,286	15.8
Wed	13,762	14.2
Thu	17,007	17.6
Fri	17,582	18.2
Sat	14,781	15.3
Sun	4,670	4.8
Total	**96,799**	**100.0**

Aircraft Type		
Type	**Ops**	**Percent**
Single Engine	81,075	83.8
Multi Engine	4,518	4.7
Jet	4,722	4.9
Air Carrier	4,458	4.6
Military	143	0.1
Helo	1,334	1.4
Other	549	0.6
Total	**96,799**	**100.0**

Runway Utilization		
RW	**Ops**	**Percent**
RW 13	73,202	75.6
RW 31	20,496	21.2
RW 18	2,793	2.9
RW 36	308	0.3
Total	**96,799**	**100.0**

Operator		
Operator	**Ops**	**Percent**
Air Carrier	4,464	4.6
Air Taxi	1,433	1.5
Flight Training	47,991	49.6
Public Service	30	0.0
Military	62	0.1
Other	42,819	44.2
Total	**96,799**	**100.0**

Source: VirTower Data (10/25/2022 - 7/31/2023)

Total Operations by Time of Day							
Time		**Takeoffs**	**Percent**	**Landings**	**Percent**	**Total Ops**	**Percent**
6:00	7:00	763	1.6	513	1.0	1,276	1.3
7:00	8:00	2,921	6.2	1,576	3.2	4,497	4.6
8:00	9:00	3,505	7.4	3,378	6.8	6,883	7.1
9:00	10:00	3,642	7.7	3,126	6.3	6,768	7.0
10:00	11:00	4,745	10.1	4,253	8.6	8,998	9.3
11:00	12:00	3,600	7.6	4,527	9.1	8,127	8.4
12:00	13:00	4,183	8.9	3,851	7.7	8,034	8.3
13:00	14:00	4,155	8.8	4,532	9.1	8,687	9.0
14:00	15:00	3,259	6.9	3,774	7.6	7,033	7.3
15:00	16:00	3,740	7.9	3,555	7.2	7,295	7.5
16:00	17:00	3,048	6.5	3,844	7.7	6,892	7.1
17:00	18:00	2,314	4.9	2,822	5.7	5,136	5.3
18:00	19:00	2,036	4.3	2,336	4.7	4,372	4.5
19:00	20:00	1,678	3.6	2,231	4.5	3,909	4.0
20:00	21:00	1,401	3.0	1,758	3.5	3,159	3.3
21:00	22:00	708	1.5	1,162	2.3	1,870	1.9
22:00	23:00	581	1.2	1,104	2.2	1,685	1.7
23:00	0:00	337	0.7	727	1.5	1,064	1.1
0:00	1:00	155	0.3	320	0.6	475	0.5
1:00	2:00	38	0.1	99	0.2	137	0.1
2:00	3:00	23	0.0	57	0.1	80	0.1
3:00	4:00	48	0.1	57	0.1	105	0.1
4:00	5:00	43	0.1	35	0.1	78	0.1
5:00	6:00	144	0.3	79	0.2	223	0.2
Total		**47,067**	**100.0**	**49,716**	**100.0**	**96,783**	**100.0**

Month	**Ops**	**Percent**
Oct 22 (Partial)	*2,249*	*2.3%*
Nov 22	9,304	9.6%
Dec 22	6,263	6.5%
Jan 23	7,730	8.0%
Feb 23	11,009	11.4%
Mar 23	10,809	11.2%
Apr 23	11,656	12.0%
May 23	12,500	12.9%
Jun 23	12,539	13.0%
Jul 23 (Partial)	*12,740*	*13.2%*
Aug 23		
Sep 23		
Total	**96,799**	**100.0%**

Night Ops	5,123	5.3%
T&G Operations:	11,144	11.5%

Step 5: Identify and Implement Safety Measures

Upon completion of the safety threat assessment, a set of recommendations were formulated to address the identified safety concern. These recommendations focused on customizing the traffic pattern at the Provo Airport for sequencing. This would involve providing additional reporting points for standard traffic pattern entry, extending the downwind leg of the traffic pattern with recommended speeds for small general aviation aircraft, and limiting the number of aircraft in the Provo traffic pattern for practicing takeoffs and landings. A second recommendation was to expand and enhance the available airspace. This could be accomplished by redesigning practice areas to accommodate additional aircraft, implement standardized transition routes, altitudes, and radio frequencies during ingress and egress into the Provo airport and surrounding practice areas. A centralized reservation and dispatch system with flight training stakeholders was also added. A final recommendation was implementing universal standard operating procedures for all aircraft operating in and around Provo Municipal and Spanish Fork Airports. These measures are aimed at mitigating traffic conflicts by alleviating traffic congestion, enhancing safety, and ensuring a more harmonious and coordinated operation in the designated airspaces.

The first five steps in the safety checklist provided a structured approach to addressing the safety concerns related to traffic conflicts in and around the Provo Municipal Airport. By following these steps, UVU was able to identify, communicate, investigate, and assess risks, involve external resources and stakeholders, and ultimately recommend safety solutions that all flight schools can follow. The proactive steps taken by UVU are an example of how to effectively address and mitigate safety concerns and create an effective safety culture within UVU and within our flight community.

Steps six and seven, respectively, enhance SMS and continuous improvement as an integral part of having a predictive mindset and creating a strong safety culture. UVU hopes this comprehensive approach will contribute to safer and more efficient operations, benefiting all stakeholders that share operations in and around the Provo Municipal Airport.

Conclusion

In the process of creating a robust safety culture, several benefits are realized. First, it is stressed that it is a continuing process. It evolves over time as an operational necessity. Change is constant, especially in a flight school environment in which certified flight instructors and students continually enter and exit the program. You are never done to the point where you can assume the safety culture is adequate and requires no maintenance. Continuous improvement is imperative. As the safety culture is enhanced, student and employee morale will increase as they feel engaged in the process. This will lead to better teamwork and communication that will result in better productivity and efficiency. All this circles around to further increase safety.

It's important to recognize the role of resilience in any safety system. Resilience is the ability to recover from setbacks quickly. The old reactive safety paradigm focused on categorizing and counting errors and then designing policy to prevent the repeat of those errors. It saw humans as unreliable and limited system components and sought to make up for their

deficiencies through regulation and automation. The proactive approach of resilience sees humans as the most reliable component of the system because of their ability to improvise in the face of the unexpected. Safety reports of traffic conflicts that are resolved successfully are an example of just that. According to Hollnagel, Woods, and Leveson, Karl Weick stated, "Safety is a dynamic non-event." Every day, aircrews are creating these non-events in the face of rapid and unpredictable change. We should recognize all that goes right and seek to understand the dynamics of success so that understanding can be applied proactively to increase aviation safety (Hollnagel, Woods, & Leveson, 2006).

UVU flight students, CFIs, and aircraft mechanics are encouraged to report on positive events resulting from hazard avoidance so that we can all learn from what goes right as well as what went wrong.

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