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# Organizational Culture Impact on Safety Within a Collegiate-Level Flight Training Program

Fiona Silcox  
*Utah Valley University*

Stephen Ley  
*Utah Valley University*

Daniel Sutliff  
*Utah Valley University*

The purpose of the research is to identify recommendations involving best practices to improve safety performance and culture within the Utah Valley University (UVU) School of Aviation Science's flight training operations. UVU flight department personnel have observed that there is underreporting of issues involving safety within the functions of maintenance and flight operations. There is concern that an insufficient level of understanding exists related to the impact that safety culture has on overall safety performance. To mitigate risk and achieve the school's goals for overall safety and operational excellence, the research was undertaken to determine: 1) how safety culture impacts flight operations and, 2) what actions can be taken to improve overall safety performance. Participants in the internal study included UVU Flight Operations staff, leadership, students, and maintenance technicians. The research included the following elements: 1) an investigation of collegiate aviation accidents and incidents to determine patterns and linkages to the research topic, 2) organizational culture impact on safety across various industries, 3) Safety culture survey, and 4) Analysis of resources and processes associated with safety programs, best practices, and standards including SMS (Safety Management Systems). Through the study, it was determined that safety culture is essential to effective safety program deployment. Key elements included effective communication and relationships between functional roles, professionalism, training and deployment of training, improved safety procedure documentation, and awareness. It is recommended additional research into the impact organizational behaviors have on safety culture and overall safety program effectiveness be pursued. Also, it is recommended that characteristics of safety culture and processes in the Federal Aviation Administration (FAA) and National Transportation Safety Board (NTSB) accident and incident reports.

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## Introduction

How does an organization establish and maintain a vibrant safety culture, and can shortcomings in that culture contribute to accidents and incidents? UVU flight department personnel have observed that there is underreporting of issues involving safety within the functions of maintenance and flight operations. There is concern that an insufficient level of understanding exists related to the impact that safety culture has on overall safety performance. To mitigate risk and achieve the school's goals for overall safety and operational excellence, the research was undertaken to determine 1) how safety culture impacts flight operations and, 2) what actions can be taken to improve overall safety performance.

We reviewed prior research through the literature on safety culture in other high-risk industries, searched the accident database for safety culture as a contributing factor, and investigated safety initiatives within the aviation industry. We then distributed a survey to discover the perception of safety culture in our own organization.

The research's purpose is to identify recommendations involving best practices to improve safety performance and culture within the Utah Valley University School of Aviation Science's flight training operations. The conclusions of the study will be used to identify priorities and recommendations to formulate an action plan within UVU Flight Operations to improve overall safety performance through an effective and integrated safety culture. Through this research, lessons learned and sharing of best practices involving the development and sustainment of a positive and effective safety culture can be considered and integrated into other flight training programs.

## Literature Review

### High-Risk Industries

In 1993, the Advisory Committee on Safety of Nuclear Installations published *ACSMI study group on human factors* defining safety culture as “The product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that can determine the commitment to, and the style and proficiency of an organization’s health and safety management system” (IATA, 2019). While this is one of the better definitions, which has since been adopted by the International Air Transport Association, a good way of looking at safety culture is simply “how people behave in relation to safety and risk when no one is watching” (ICAO, 2018). To gain a broad perspective on safety culture, we began with a look at other high-risk industries.

The mining industry is well known as one of the riskiest in the world. A 2014 study of coal mine safety revealed that a low percentage of miners valued safety highly or had a positive

attitude toward the application of formal safety standards. It was found that positive changes in the safety culture were dependent upon the determination of the top-level managers. This was confirmed by the success of an employee behavior modification program implemented at a coal mine in Poland that was able to reduce the accident rate by half two years after its introduction (Martyka et al., 2014). A later study reinforced this approach and concluded that “management’s commitment was the biggest contributing factor to the formation of safety culture and must be strengthened to ensure it can be executed smoothly” (Ismail et al., 2021). Since collegiate flight instructors are seldom employed for more than two years, the challenge may be in achieving these results in a compressed time.

The shipping industry is also known as one of the most dangerous and has experienced several catastrophic accidents throughout the years. A 2016 safety culture assessment revealed the value of continuous company involvement in safety promotion rather than occasionally or only when an accident occurs. The assessment identified a weakness in that “sometimes the rules concerning safety are bent to ensure a sailing goes ahead when an individual or community needs it” (Arslan et al., 2016). This finding is particularly instructive for the flight training industry. Pressures to complete each mission for the benefit of the student and/or the organization are constant. Management must continuously demonstrate that safety cannot be compromised for any reason.

Some high-risk industries have accepted the concept of regulatory oversight of safety culture. The International Atomic Energy Agency (IAEA) has developed high-level good practices for effective regulatory oversight of safety culture. These include a structured framework for safety culture oversight and the promotion of a proactive approach to identify and influence both individual and organizational behaviors for the continuous enhancement of safety (IAEA, 2013).

While it may seem counterintuitive to regulate something as amorphous as culture, a study of the Norwegian petroleum industry concluded that “ambiguous concepts like culture may actually have a function in regulation, despite exceeding the grasp of traditional command and control regulation” and that ambiguity can be productive in that it “broadens the discourses of safety in the industry and sends confused companies searching for safety beyond the places they would normally go.” (Antonsen et al., 2017). Confused or not, it seems beneficial to think creatively regarding safety. Seemingly harmless acts can affect overall culture and, over time, may result in unsafe practices.

Cultures can be good or bad and have relative impacts on safety. Safety culture is the result of interactions between people in the workplace. While safety culture may be difficult to define, positive safety culture practices or aspects of safety culture can be monitored and regulated (Naevestad et al., 2019).

One study suggests a model unique to the construction industry and its geographically scattered nature. It distinguishes between safety culture and safety climate in that culture represents the core values that guide safety decision-making by management, and climate refers to practices and behaviors in the workplace (Al-Bayati et al., 2019). There is no more geographically scattered industry than aviation, and even basic flight training involves a degree

of geographic separation between management and staff. This concept may hold some promise for flight training operations, for it outlines the need to distinguish between culture and climate.

A summary review of safety culture in other high-risk industries reveals the following considerations as we address safety culture in collegiate aviation: 1) Management must be committed to a positive safety culture and demonstrate that commitment through a consistent emphasis on safety, 2) The ambiguous nature of culture may be a benefit rather than an additional challenge as we search for creative ways to create and maintain a positive safety culture, 3) Regulation or regulatory type enforcement of positive practices affecting safety culture may be appropriate, and 4) A distinction between safety culture and safety climate may help to achieve positive aspects of both.

### **Safety Initiatives**

The FAA has established several safety programs and safety reporting initiatives, including the safety management system (SMS) and the aviation safety action program (ASAP). The goal of these programs is to enhance safety through the prevention of incidents and accidents. Aviation flight organizations, including certificate holders under FAR Part 141 pilot schools and Part 145 repair station operators, are allowed to enter into a formal agreement with the FAA to implement a SMS and ASAP (FAA, *Aviation Safety*). Training organizations not wishing to enter into a formal agreement have the option to participate in the FAA's SMS voluntary program (SMSVP) (FAA, *Safety Management System*).

The National Aeronautics and Space Administration (NASA) has developed a safety initiative called the aviation safety reporting program (ASRP). The ASRP is a safety program that provides users of the National Airspace System (NAS) to report aviation safety deficiencies and/or discrepancies. The FAA currently works with NASA to receive and process aviation safety reports through its ASRP (NASA, *ASRS*).

Private organizations such as Aircraft Owners and Pilots Association (AOPA) and the National Business Aviation Association (NBAA) have several educational and safety resources available to assist flight organizations in developing and implementing an SMS. AOPA, through its Aviation Safety Initiative (ASI), provides free resources on educational material and safety initiatives to improve safety and mitigate accidents and incidents in general aviation (AOPA, *Air Safety Institute* 2022). NBAA provides pilot training resources in the form of articles covering safety training guidelines and audit tools for airport operators (NBAA, *Resources: Safety: NBAA*).

### **Accident Report Review**

An important research question that was investigated asked, "Can aviation training accidents be partially attributed to safety culture?" To answer that question, reported aircraft accidents and incidents were reviewed for a targeted population of flight schools within the Western region of the United States. To narrow the population, research was conducted to include flight schools that had characteristics similar to Utah Valley University. All flight schools were University Aviation Association (UAA) members within a geographic area

surrounding Utah that had similar terrain features, mountains, deserts, and higher elevations. Schools included universities and community colleges, public and private, that operated flight training programs. Data was collected from reports within the last 15 years, from 2007 through 2022.

Public domain accident/incident databases included 1) FAA Accident and Incident Data System (AIDS) found within the FAA Aviation Safety Information Analysis and Sharing System (ASIAS), 2) National Transportation Safety Board Aviation Accident and Incident Data System (NTSB), 3) Aviation Safety Reporting System (ASRS) Database Online, and 4) Lessons Learned from Civil Aviation Accidents (FAA). The ASRS and Lessons Learned from Civil Aviation Accidents (FAA) yielded no attributable data to the research.

Research of accidents and incidents within the listed AIDS/ASIAS and NTSB databases resulted in 14 flight programs within the targeted population and contained 15 records that had content identified as relevant to the parameters of the study in which risk could have been mitigated through a demonstrable safety culture within the flight organization. Thirteen of fifteen records were related to one of the following categories: inadequate supervision by flight instructor (5 reports); pilot not following checklist procedure (3 reports), poor decision making/lack of judgment (3 reports), maintenance issue (1 report), and flight proficiency (1 report). Only one accident record was specifically identified as an organizational issue, with two additional records that could also be included in the organizational issues category as a contributing factor.

## **Research Methodology**

The UVU School of Aviation Sciences conducted a survey to determine the impact organizational culture and departmental relationships have on operational safety within the UVU School of Aviation Sciences Flight Department. The research included the following four elements: 1) an investigation of collegiate aviation accidents and incidents to determine patterns and linkages to the research topic, 2) organizational culture impact on safety across various industries, 3) Safety culture survey with UVU flight staff, students, and Line and Maintenance personnel, 4) Analysis of resources and processes associated with safety programs, best practices, and standards including SMS (Safety Management Systems). Element (1) was conducted using standard research methods to data mine specific accident and incident databases targeting populations relevant to the study. Research element (3), the safety culture survey, received UVU Institutional Review Board (IRB) approval and was conducted through a qualitative survey online using Qualtrics as a data collection tool. Participants in the internal study included members of Flight Line Services, Aircraft Maintenance, Records, Scheduling, Dispatch Services, Flight Instruction, and active Flight Students.

## **Survey & Accident Data Analysis**

### **Survey Analysis**

The survey analysis herein will follow a simple question and response format, followed by a brief commentary on the observations made by the researchers related to the significance of

the response or the implications to the flight department related to embedding safety culture within the flight department. Only those survey questions determined to be significant to the study were included in this paper.

Survey Population: The survey resulted in 129 respondents. Roles within the respondent population were 51.6% flight students, 25.58% flight instruction, 9.30% aircraft maintenance, 7.75% records, scheduling, and dispatch services, and 6.20% flight line services. The distribution represents a close approximation of the flight department's organizational structure.

Question 1 - Based on your perspective, identify the level to which organizational culture impacts safety within the UVU flight department.

The response to the question was 'High' with an average of 7.29 out of 10. This response to the researchers indicated that the flight department recognizes a relationship between the quality or health of organizational culture and safety program effectiveness.

Question 2 - Do you feel the safety procedures and policies are effectively communicated, accessible, and utilized within the UVU flight department for your role?

81% of the responses were 'mostly yes,' to 'definitely yes.' However, 1/5 of the population indicated there is an opportunity for improvement.

Question 3 - Relationships and trust amongst functional groups within the flight department, either positive or negative, can impact the safety of flight operations. To what level do you agree or disagree with this statement?

Responses indicated that 94% of the respondents feel relationships and trust can impact safety. This closely correlates with Question 1 above related to the level of organizational culture impacts safety, which was rated 'High.' Thus, the elements that make up an organizational culture, relationships, and trust, are viewed as impactful to safe flight operations. This is a critical finding. The reverse of this, a discordant organizational culture with fractured or no relationships nor trust within or between groups can negatively impact safety within the department. Close attention must be made to having positive relationships amongst the functional groups within the department.

Question 4 - How would you rate the quality of the relationships and trust between the various flight department functions (line operations, maintenance, flight operations, dispatch, scheduling, etc.) as a whole?

The response to this question scored 5.58 out of 10. According to the scale given, this rates slightly above "Warm, we can talk about the weather and sports," and falls short of the next level, "7, Very good, constructive and interactive, willing to the have lunch together." There is a near split between positive and negative views on the quality of the relationships within the flight department. This should be a focus area for opportunities for improvement.

Question 6 – For the focus area listed, rate the effectiveness of each within the UVU flight department.

The respondents were given 16 functional categories in which they were to rate the level of perceived effectiveness. An average score for each category was calculated and then plotted using a graph (Ref. Fig. 1). The following outcomes were observed:

Most Effective

- Operational Condition of Aircraft
- Maintenance of Aircraft
- Line Operational Safety

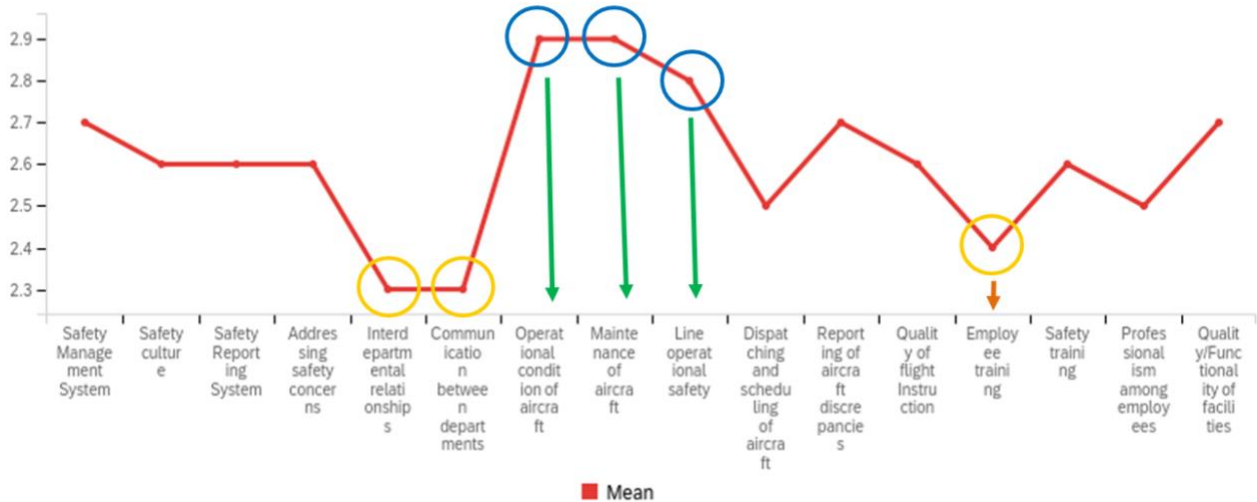
Opportunity - Improvement

- Interdepartmental Relationships
- Communications b/w Departments
- Employee Training

It is interesting to observe that the top 3 opportunities for improvement were related to attributes of organizational behavior, or in the context of this paper, safety culture. This data also correlates to Question 1 regarding the high score given to the importance of organizational culture impacting safety. This suggests the elements that need to be improved upon within the flight department.

**Figure 1**  
*Rating of Effectiveness*

Rating of Effectiveness



Question 7 - How would you grade the current safety program within UVU Flight Operations? 89.5% of respondents scored the safety program at B or better. The score infers the flight department is confident of the department's safety program but that there is room for improvement overall.

Written Comments - The survey included two optional questions with free-form text responses. The two questions included 1) Do you feel the safety procedures and policies are effectively communicated, accessible, and utilized within the UVU flight department for your role? and 2) What steps can be taken to improve the safety culture or safety effectiveness within the UVU Flight Department? Are there any areas of concern that you would like to have addressed?

Written comments were grouped together and categorized based on the 16 common subjects used in Question 6. There were a total of 73 usable written comments of which 80% of the comments were focused on the following topics listed below. The frequency count is given in parentheses.

Topics most frequently commented

- Safety Culture (21)
- Safety Training (20)
- Professionalism (19)
- Interdepartmental Relationships (15)
- Communication b/w Departments (15)
- Quality of Flight Instruction (14)

The topics most frequently discussed are consistent with responses given in Question 6, with some variation in topics included.

### **Analysis Summary – Accident and Incident Reports**

Careful analysis was performed on each of the reported accidents/incidents in the context of the definition and characteristics of an effectively embedded safety culture. Based upon the report narratives of causal factors, each of the reviewed reports may have been mitigated through a demonstrable safety culture within the flight department. Although safety culture was never specifically identified as a root cause, nor a recommendation, it was observed that an effective safety culture could have mitigated these events. The observations included a lax attitude towards proper discipline, professionalism, and judgment, which seemed to have existed. One accident report specifically identified ‘organizational issues’ as a contributing factor within the report. The narrative was notably the longest of the 15 used within the study and one of the most detailed and constructive. It was apparent to the researchers that organizational issues that result in ineffective safety programs, lack of communication, sustainment of specific flight maneuver proficiency, and inconsistent reporting processes can result from an ineffective safety culture.

### **Study Outcomes & Recommendations**

The purpose of the study was to identify areas of improvement to the overall safety performance and safety culture in UVU’s collegiate aviation program and to further implement best practices to improve safety performance through an effective and integrated safety culture. Study results identified five priorities for improvement: 1) Interdepartmental Relationships, 2) Communication between Departments, 3) Quality of Flight Instruction, 4) Employee and Safety Training, and 5) Professionalism among Employees. A summary of recommendations for each is given below.



Priority No.1 and 2: Interdepartmental Relations and Communication between Departments. Recommendation, develop a stakeholder working group from each functional area to create an aviation department employee handbook that encompasses safety policy and procedures and will be reviewed annually. Recommendation, do team-building activities and training events to generate a greater collegiate spirit and team atmosphere within the flight organization.

Priority No.3: Quality of Instruction. Recommendation, expect professionalism and leadership behaviors within the department through education, setting of standards, and visual resources used throughout the facilities. Recommendation, improve the quality of instruction and policy awareness by developing a Flight Student Handbook summarizing UVU's flight safety policy and procedures and delivering through mandatory training and regularly scheduled meetings. Recommendation, to improve the on-time completion of flight-training labs, the training syllabi should be reviewed to include an evaluation of lesson frequency, quality, and sufficiency of the depth of training topics.

Priority No.4: Employee and Safety Training. Recommendation, establish mandatory training by students and staff and increase the frequency of recurrent training on topics such as UVU Flight Department standard flight operating procedures, airport safety and security, safety orientation training, and the safety-reporting program. This will be achieved by utilizing an online delivery platform, such as Canvas or UVU's learning management system.

Priority No. 5: Professionalism among Employees. Recommendation, implement a policy requiring the wear of standardized, approved, uniform apparel by all flight operations employees and flight students. Recommendation, as mentioned above, set expectations and provide training on topics related to professionalism to ensure appropriate conduct, attitudes, and effective communication and sustainment of functional relationships. Recommendation, conduct 'pulse surveys' regularly to attain student and staff feedback on any concerns they may have and organize working groups as necessary to remediate those concerns. Recommendation, through an anonymous self-reporting system, students should be given the opportunity to provide feedback on flight instructor behavior or quality that is not consistent with expectations. Recommendation, utilize a separate reporting system for safety-related concerns vice employee grievances. It was noted in the survey that the safety reporting system was being used inappropriately to air grievances vice items that directly impacted safety. However, these are important, as they can impact overall safety culture and, therefore, must be addressed timely and in a structured manner.

## **Conclusion**

The research was undertaken to determine 1) how safety culture impacts flight operations and, 2) what actions can be taken to improve overall safety performance. We discovered through a comprehensive literature review that other industries are effectively managing culture to improve operational safety and that multiple resources are available from the aviation/aerospace industry to aid in the creation and maintenance of a robust safety culture. A review of the accident database revealed that a lack of safety culture could lead to accidents and injuries. Our

survey indicated the areas in which safety culture needed to be enhanced. Armed with this information, we produced a list of actions designed to enhance the safety culture at UVU. It is recommended additional research into the impact organizational behaviors have on safety culture and overall safety program effectiveness be pursued. Also, it is recommended that characteristics of safety culture and processes be included in the FAA and NTSB accident and incident reports. In collegiate flight training operations, several different functional groups must work together smoothly to create the safest possible flight operations environment. Behaviors that contribute to a positive safety culture must be reinforced, and those that do not must be discouraged. Collegiate aviation has an opportunity to provide new aviators with an example of positive safety culture that will last through their careers and spread through their examples.

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