I Gotta Get These Cross Countries Done!: Instructor Guide

Title

I Gotta Get These Cross Countries Done!

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Discipline

Aviation Science

Target Audience

Intermediate, majors and nonmajors

Keywords

Weather, climatic mechanisms, cross country flying, flight, flying, weather products

Length of Time/Staging

Approximately two weeks with three half-hour in-class sessions.

Abstract

The purpose of this Problem Based Learning exercise is to deepen the participants' understanding of the weather and aeronautical decision-making. Post-PBL, the students should be able to effectively read weather products available to pilots, accurately interpret weather

products, understand the climatic mechanisms involved, and develop effective decision-making strategies.

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Format of Delivery

PBL description and rubric given to students at the beginning of the class period. Instructor reads the description and offers some additional insight. The PBL participants are separated into groups of four. The groups are then allowed to discuss the problem for the remainder of the period. The instructor ensures that each group has a basic understanding of the problem and that each participant has an assigned research activities from the group.

The time in subsequent class periods is used for lecture/discussion and individual group discussion.

Student Learning Objectives

1. Effectively read weather products available to pilots
2. Accurately interpret weather products
3. Understand the climatic mechanisms involved
4. Develop effective decision-making strategies

Student Resources

Students are directed by the instructor to appropriate sources of information.

Instructor Resources

Primary texts for this course were:

- Moran, J. M. Online Weather Studies. American Meteorological Society.
- AC 00-6A, Aviation Weather. FAA.
- AC 00-45E. Aviation Weather Services, FAA.

The following questions would be applicable to students at the commercial pilot level:

Part 1.

- What conditions must exist in order to create the updrafts and downdrafts that the sigmet is reporting?
- Why would updrafts and downdrafts be a concern for the flight back to San Diego?
- What severity of up and down drafts can we expect (ft per minute)?
- What conditions normally prevail in the Southern California region?
- What other conditions may exist in conjunction with these up and down drafts that would affect the flight back?
- Where are the most hazardous conditions most likely to exist?

- What would the most effective strategy for returning to San Diego?

Part 2.

- How should your flight plan be modified to accommodate the current conditions?
- Could the surface winds be connected to the updrafts and downdrafts that you encountered earlier in the flight?
- Is it likely that a front caused the weather that you are experiencing during this flight?
- What type of front could cause this type of weather and why?
- What weather reports would be useful in making decisions in this case?
- Had you looked at the surface prognostic chart, what type of conditions must have existed for these conditions to occur?

Part 3.

- What effect does ocean temperature have on climate (micro/macro)?

There are helpful references in:

Horne, T.A. (1999). *Flying America's weather: A pilot's tour of our nation's weather regions*. Newcastle, WA: Aviation Supplies & Academics. (TL558.U5 H67 1999)

International Civil Aviation Organization. (2004). Council. *Meteorological service for international air navigation: international standards and recommended practices.* Montreal, Quebec, Canada: International Civil Aviation Organization. (TL500.5 .I56 15th ed. 2004)

Lankford, T.T. (2001). *Aviation weather handbook*. New York: McGraw-Hill. (TL556 .L355)

Lankford, T.T. (2002). *Radar and satellite weather interpretation for pilots* (3rd ed.). New York : McGraw-Hill. (TL556 .N48 2002)

Lankford, T.T. (2001). *Weather*. New York: McGraw-Hill. (TL556 .L362 2001)

Lankford, T.T. (2000). *Weather reports, forecasts & flight.* (3rd. ed.). New York: McGraw-Hill. (TL556 .L36 2000, also available electronically)

(2004). *Manual of aeronautical meteorological practice*. Montreal, Quebec, Canada: International Civil Aviation Organization. (TL556 .M35 6th ed. 2004)

(2001). *Manual on coordination between air traffic services, aeronautical information services and aeronautical meteorological services*. Montreal, Quebec, Canada: International Civil Aviation Organization. (TL556 .M368 2nd ed. 2001)

Morrison, T. (2002). *Quest for all-weather flight*. Shrewsbury, England: Airlife Publishing. (TL711.B6 M67)

Perkins, P.J. (2001). *In-flight icing* (2nd. ed.). Batavia, Ohio: Sporty's Pilot Shop. (TL553.5 .P47 2001)

Quantick, H. R. (2000). *Climatology for airline pilots* (1st ed.). Malden, MA: Blackwell Science. (TL556 .Q33 2000)

Underdown, R. B. and Standen, J. (2003). Ground studies for pilots. *Meteorology* (3rd ed). Malden, MA: Blackwell Science. (TL586 .U48 2003)

Weather related web sites should be visited by the student:

- www.ametsoc.org/amsedu
- aviationweather.gov
- www.nws.noaa.gov
- www.weather.com
- www.faa.gov
- www.ntsb.gov
- rst.gsfc.nasa.gov/Sect14/Sect14_1c.html

Author's Teaching Notes

This PBL was taught as part of the Flight Science undergraduate program at Parks College, Saint Louis University. The audience is freshmen completing their private pilot's license. The content here can be used to direct a class toward much of the material required of the private through commercial pilot test standards.

This particular problem was issued at the end of the course and requires knowledge of most of the areas required at the private and commercial pilot level for the student to complete effectively

Current data from FAA standardized testing shows a statistically marginal improvement over past non-PBL courses. Student response to the problem, from the feedback form and college review, was overall very positive. Most negative remarks involved answers such as "too much research", "difficult to get together", "unclear what was required".

Either use of guidance questions from the instructor or questions developed by the students to frame the problem is encouraged. Often students find the problem very frustrating without some initial guidance. However, after several opportunities to work on PBL exercises, students begin to understand the value of a PBL problem in preparing them for complex situations that may arise in an aircraft and accept the indeterminate nature of the problems.

Instructors from other disciplines may find this problem useful if they are able to provide some support concerning aircraft performance to the students.

Assessment Strategies

Grading of the activity is based upon both the final presentation/report and the peer grading between the students from the student feedback form (found in the problem folder).

When calculating peer grades, both the highest and lowest scores were omitted from the final evaluation, in an attempt to avoid personal bias.

This method proved to be a very successful metric to both the students and myself.