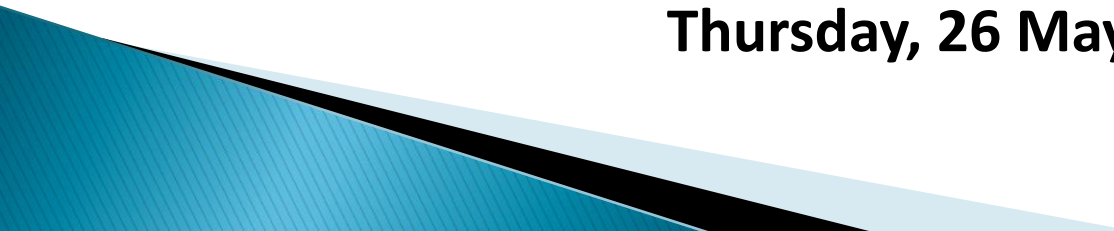


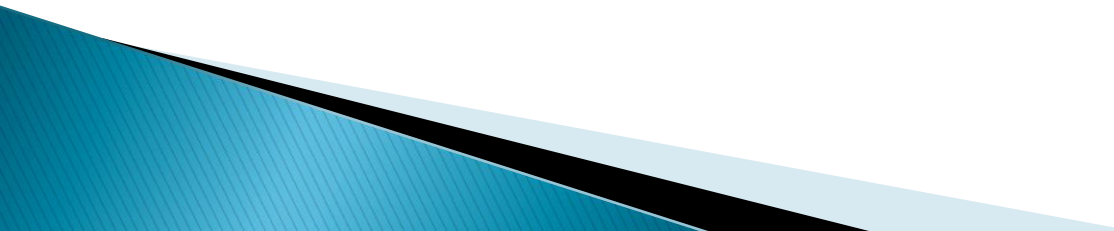
A NEXRAD Education and Training Module for Use by General Aviation Pilots

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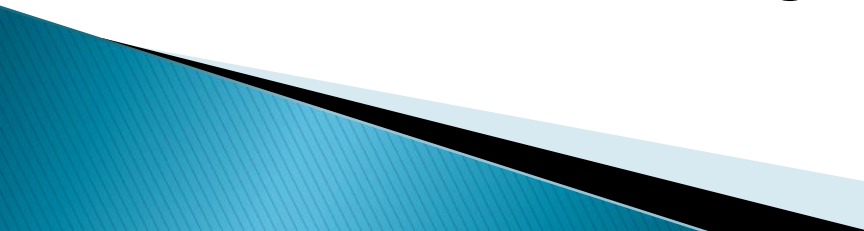
Outline

- ▶ Task 3 Review
 - ▶ Problem Statement
 - ▶ Research Approach
 - ▶ ISD Process
 - ▶ Module Overview and Examples
 - ▶ Method of Assessing the Module's Effectiveness
 - ▶ Results
 - ▶ Discussion
 - ▶ Recommendations
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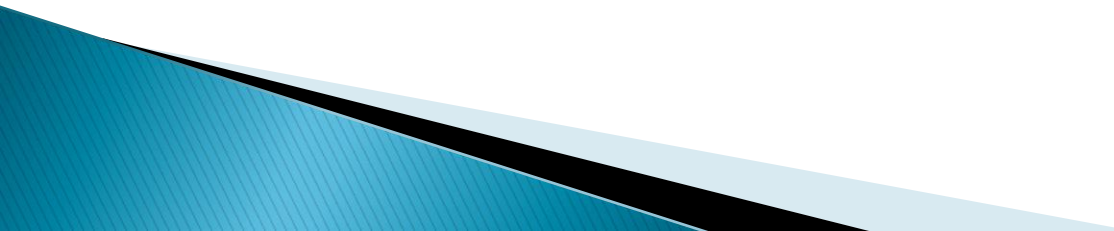
Task 3 Review

- ▶ Conduct research necessary to develop guidance for pilot training and evaluation criteria
 - Instructional Systems Design (ISD) criteria to develop learning objectives for module
 - Develop module based on learning objectives
 - Use appropriate Human Factors (HF) standards to develop assessments
 - Develop recommendations based on results of the study

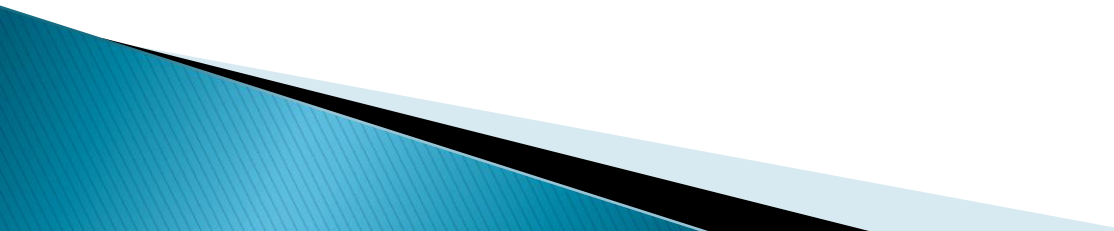
Problem Statement

- ▶ A 2005 NTSB report indicates that pilots can incorrectly answer all weather knowledge questions and still receive passing scores
 - ▶ Convective weather is still a problem for aviation, especially GA
 - ▶ Weather technology is expanding significantly, especially with in-cockpit tools such as real-time NEXRAD
 - ▶ Little to no training is being given for these tools
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Research Approach

- ▶ Training needs to be given to pilots on how to use the tools wisely
 - ▶ Pilots need training on
 - What the tool is
 - How it is produced
 - What the limitations are
 - How the tool can help with decision making
 - ▶ Development and deployment of module on NEXRAD
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ISD Process

- ▶ Instructional Systems Design criteria were used to develop the module and the assessments
 - ▶ Needs Assessment
 - ▶ Learning Objectives
 - ▶ Assessment Items
 - ▶ Content and Module Materials
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Module Overview

- ▶ PowerPoint based, 2 ½ hour presentation
- ▶ Sections include:
 - Radar Basics
 - NEXRAD
 - Basics
 - Specifics and Limitations
 - Precipitation vs. Clear Air Modes
 - Thunderstorm Basics
 - Products
 - Scenarios

Module Examples

Severe and “severe”

- Every storm can be severe for aviators
- A lack of a watch or warning does not mean the weather is safe
- Even clouds can be dangerous and disorienting
- 20 mile separation



Flight Planning Exercise

- You and a group of friends are in Las Vegas, NV. Remembering you are a pilot, your friend asks you to charter a flight from North Las Vegas (KVGTT) to Elko Regional Airport (KEKO) to visit the Red Lion Hotel and Casino in Elko, NV.
- Will you have NEXRAD coverage for the entire flight?

NORTH LAS VEGAS AIRPORT

VGTT

Scenario Example

- ▶ Fly home to go to your 10 year high school reunion
- ▶ Fly a Cessna 182 VFR from Sioux Falls, S.D. to Burlington, IA
- ▶ The following weather information is available:
 - Surface Analysis
 - Local radar echo tops
 - Satellite/Radar
 - Regional radar mosaic
 - METAR/TAF
 - National radar mosaic
- ▶ Participants work through the scenario using what they have learned in the module

Purpose of the Assessment Portion of the Study

- ▶ The purpose of this portion of the study was to test the effectiveness of the training module
- ▶ Pre- and post-test design with a control group
- ▶ Hypothesis:
 - The training will result in higher knowledge scores, higher self-efficacy scores and higher reaction scores

Method

Participants

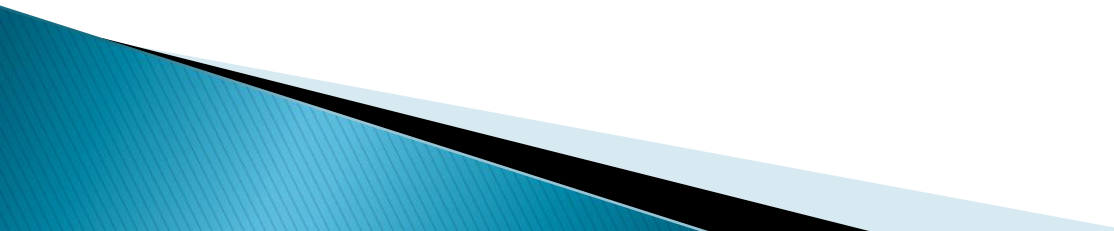
- ▶ 60 participants: 56 male, 4 female

	Mean	S.D.	Median	Range
Age	21.2	3.0	20	17-33
Flight Hours	257.6	454.2	140	68-3,500
Years Flying	3.6	2.7	3	0-19

- ▶ All have private pilot's license
- ▶ Instrument-56.6%, Flight Instructor-15%
- ▶ 57 had additional weather courses (95%)
 - Mean number of additional hours 6.6 (SD=3.1)

Method

Dependent Variables/ Measures

- ▶ Pre-Test
 - Demographics, Radar Experience, Self-Efficacy, Radar Knowledge, Scenario 1
 - ▶ Post-Test
 - Reactions, Self-Efficacy, Radar Knowledge, Scenarios 1 and 2
 - ▶ Post-Post-Test
 - Scenario 3
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Method

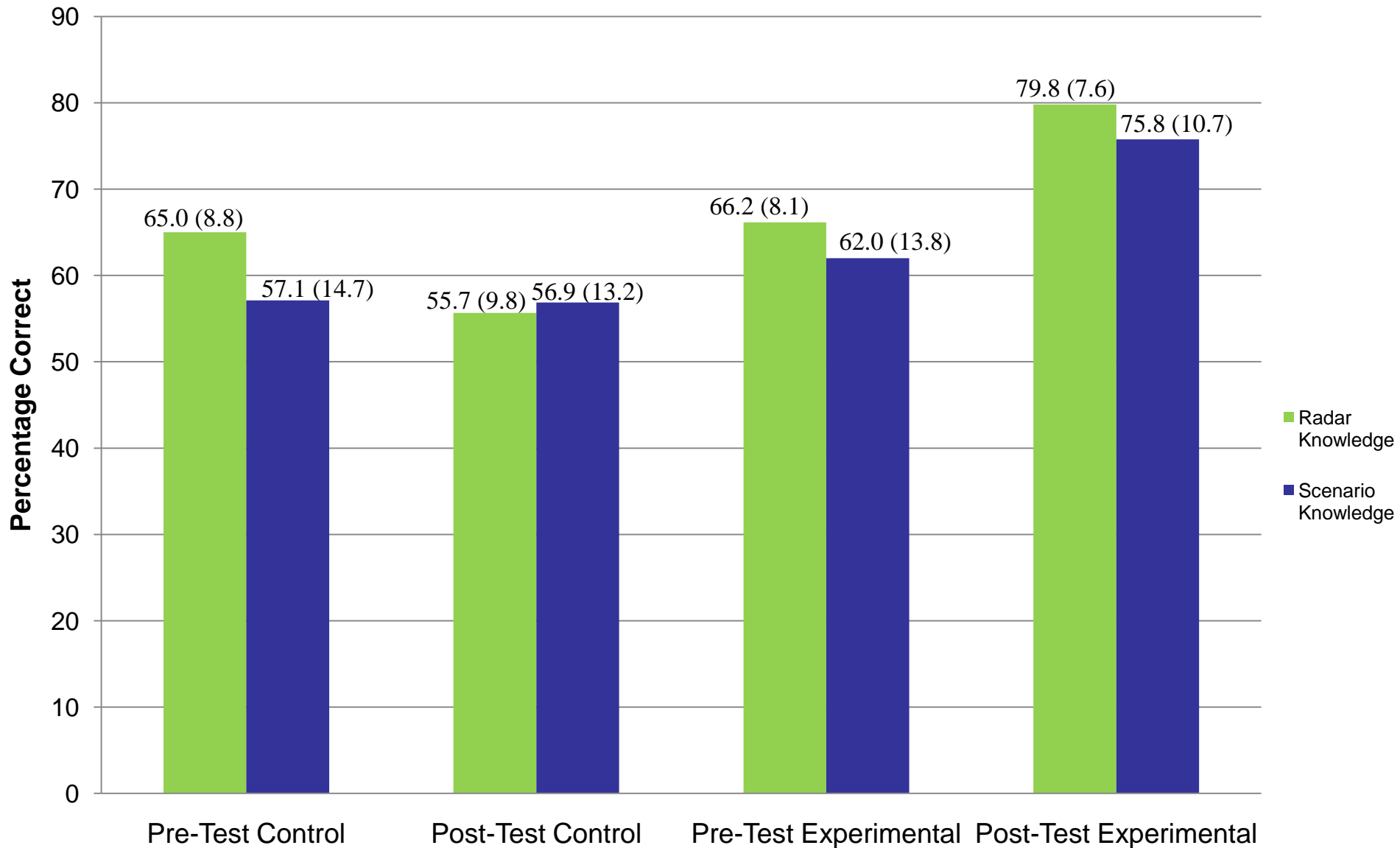
Procedure

- ▶ Random assignment to control/experimental groups

Experimental	Control
Pre-Test	Pre-Test
NEXRAD Module	Weather and Aviation Films
Post-Test	Post-Test
Post-Post-Test- 3 days later	Post-Post-Test-3 days later

Results

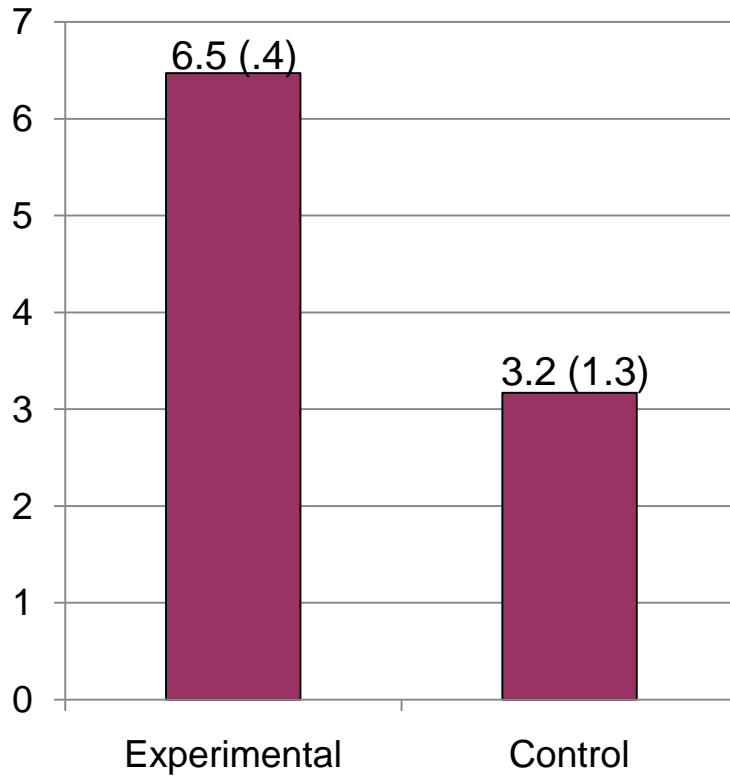
Means



Results

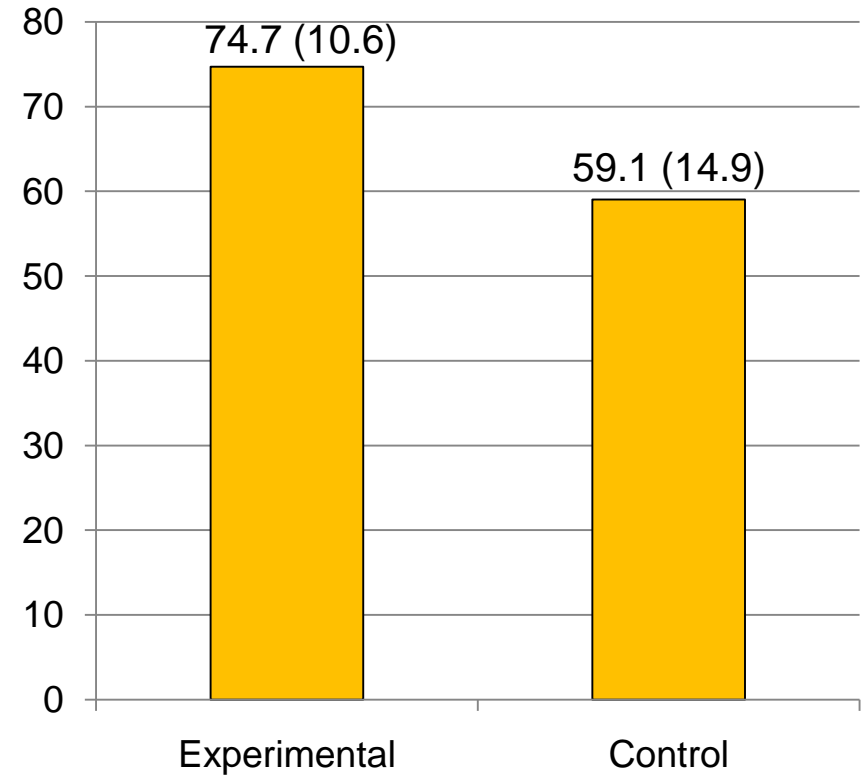
Reactions and Post-Post Test

Reactions



T-test-sig. $p < .000$

Post-Post Scenario Test



T-test-sig. $p < .000$

Discussion

- ▶ Participants who received training had greater knowledge of radar concepts, better performance on weather scenarios, higher self-efficacy, and higher reaction scores
- ▶ Overall, the results strongly suggest that a small amount of *focused* weather training has a lot of potential to help pilots learn and make better decisions
- ▶ Potential for module to be used on WINGS website for future training, or in person training much like experiment

Recommendations

- FAA Advisory Circulars need to be updated and reorganized (see results of Task 2 work)

AC Number	Title	Year Published	Years Since Publication
00-6A	Aviation Weather	1975	36
00-24B	Thunderstorms	1983	28
00-54	Pilot Windshear Guide	1988	23
00-54	Atmospheric Turbulence Avoidance	1997	14
00-57	Hazardous Mountain Winds and their Visual Indicators	1997	14
00-62	Internet Communications of Aviation Weather and NOTAMS	2002	9
00-63	Use of Cockpit Displays and Digital Weather and Operational Information	2004	7
00-45G	Aviation Weather Services	2010	1

- Practical Test Standards and Knowledge Banks need to be updated

Questions?

