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## Assessing General Aviation Pilots' Weather Knowledge and Self-Efficacy

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# Assessing General Aviation Pilots' Weather Knowledge and Self-Efficacy

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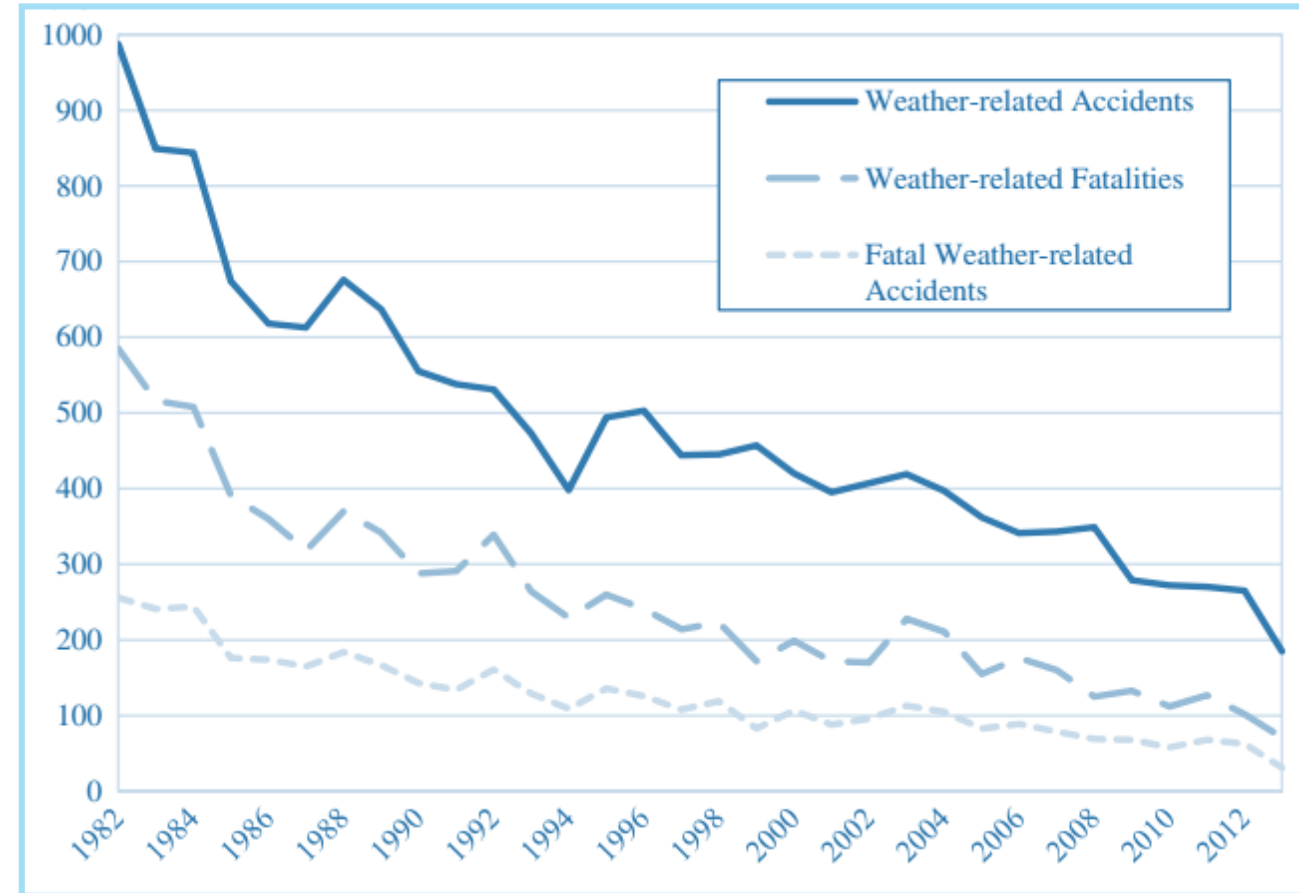
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# The Problem...

- General Aviation accounts for a majority of weather related accidents
- Most GA weather-related accidents result in fatality
- NTSB Most Wanted List - loss of control
  - manage weather issues



GA Weather-Related Accident Rate

# Contributing Factors to the Unchanging High General Aviation Weather-Related Accident Rate

- Research indicates numerous contributing factors to the General Aviation Weather Problem
  - Lack of Aviation Weather Knowledge & Skills
  - Poor Decision Making
  - Weather Technology & Product Usability
  - Limited Weather Training
  - Conflicting & Out-of-Date Pilot Resources

# How to assess pilot weather knowledge?

- Current method is through FAA Knowledge Test Questions
  - Some questions are out of date and easy
  - Very few questions focused on interpretation of current products
- A multidisciplinary team of Human Factors Specialists, Meteorologists, & Pilots developed an Aviation Weather Knowledge Test
- 95 Questions
  1. Basic Weather Theory
  2. Product Interpretation
  3. Weather Sources

# 204 Pilots Participated

- Both ERAU Students and GA pilots at EAA Airventure
- Average Age: 22.5 years
- Part 61: 60 pilots & Part 141/142: 143 pilots

Pilot Certificate and/or Rating	Number of Pilots (Total = 204)	Flight Hours (Median)
Student	41	35 hours
Private	72	105 hours
Private with Instrument	50	172 hours
Commercial with Instrument	41	260 hours

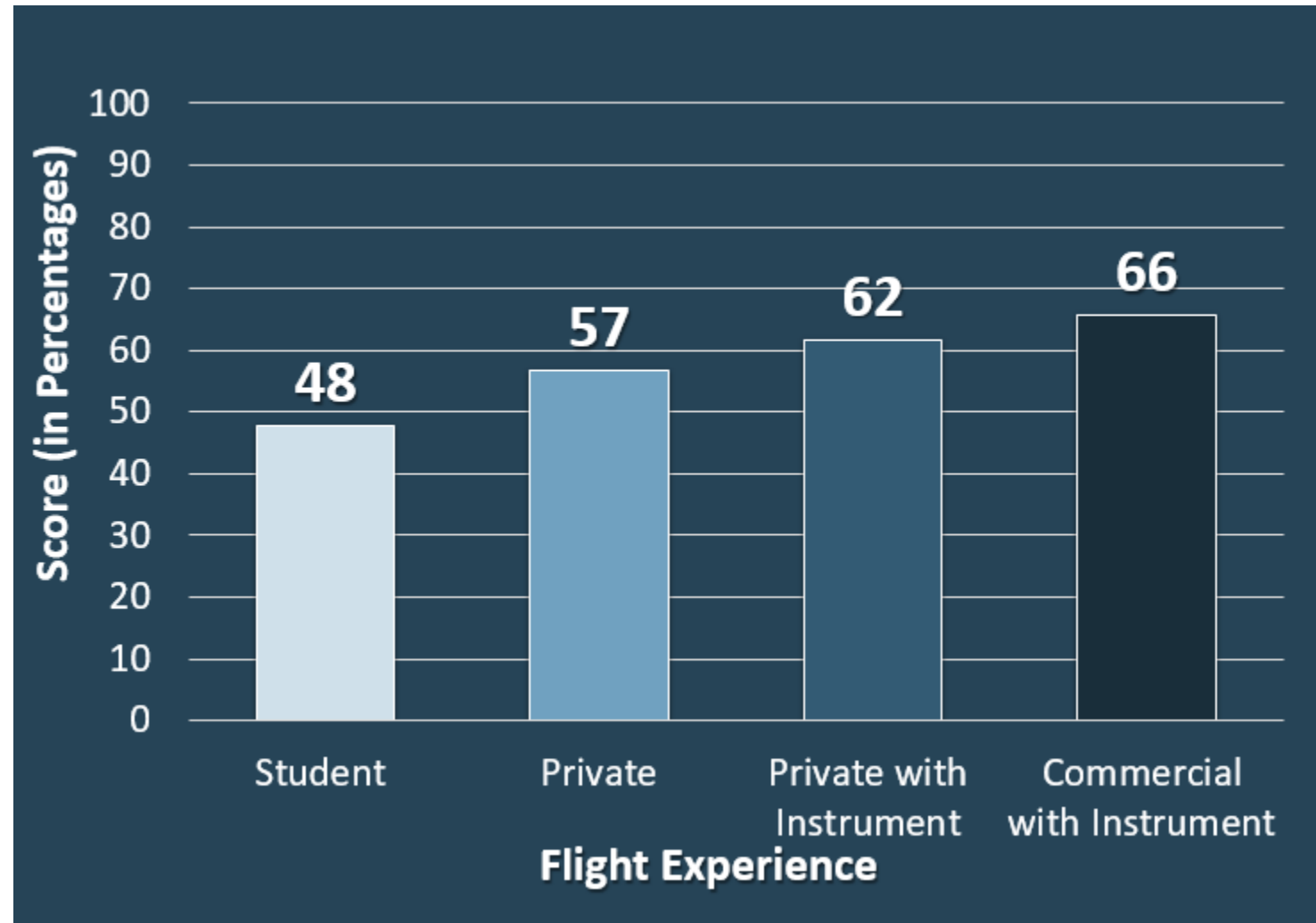
# The Results!





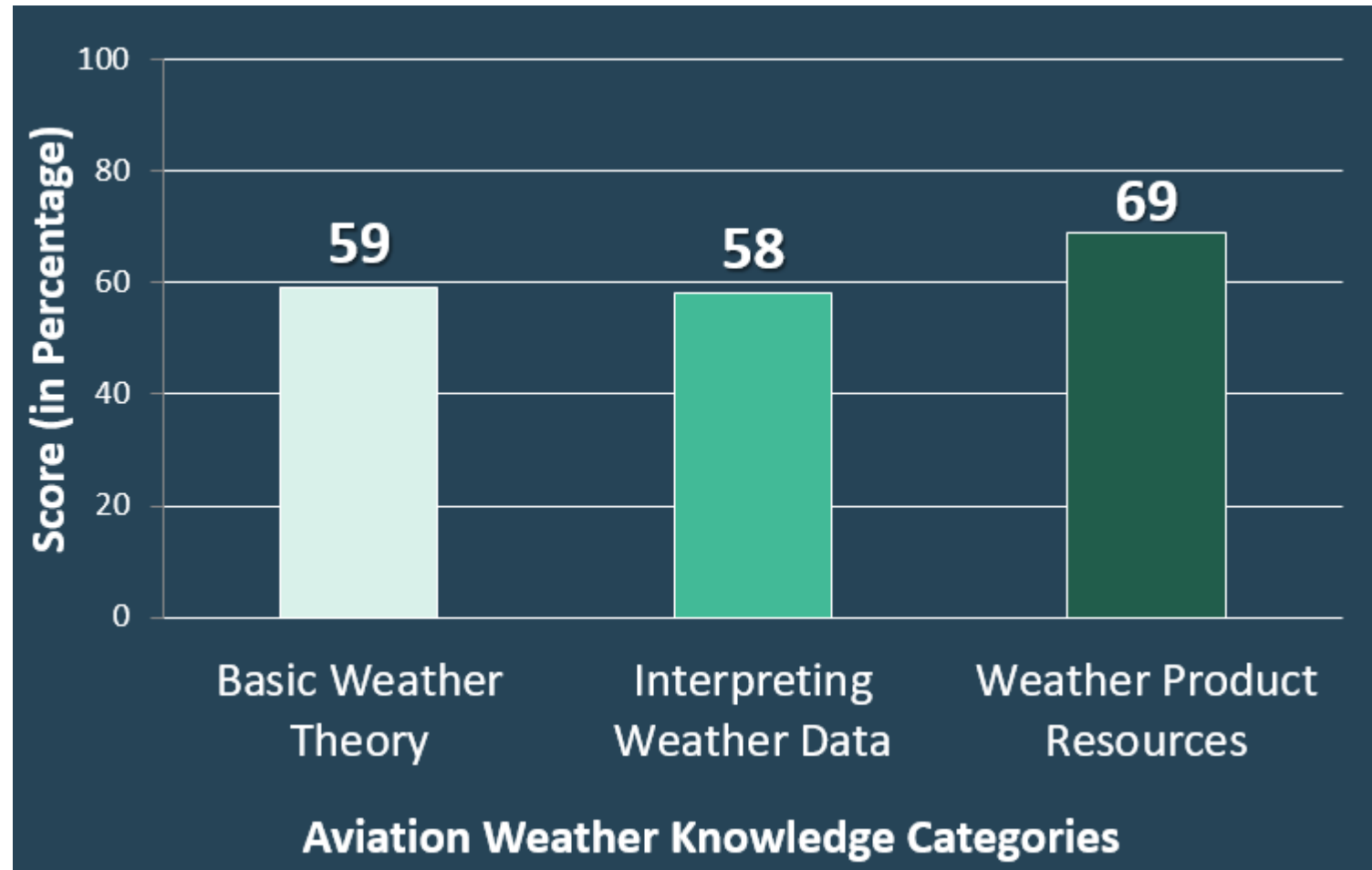
# Overall GA Weather Knowledge

- Scores increased with flight experience
- Statistically significant differences between
  - student vs private pilot groups
  - private vs commercial with instrument groups
- These trends were consistent



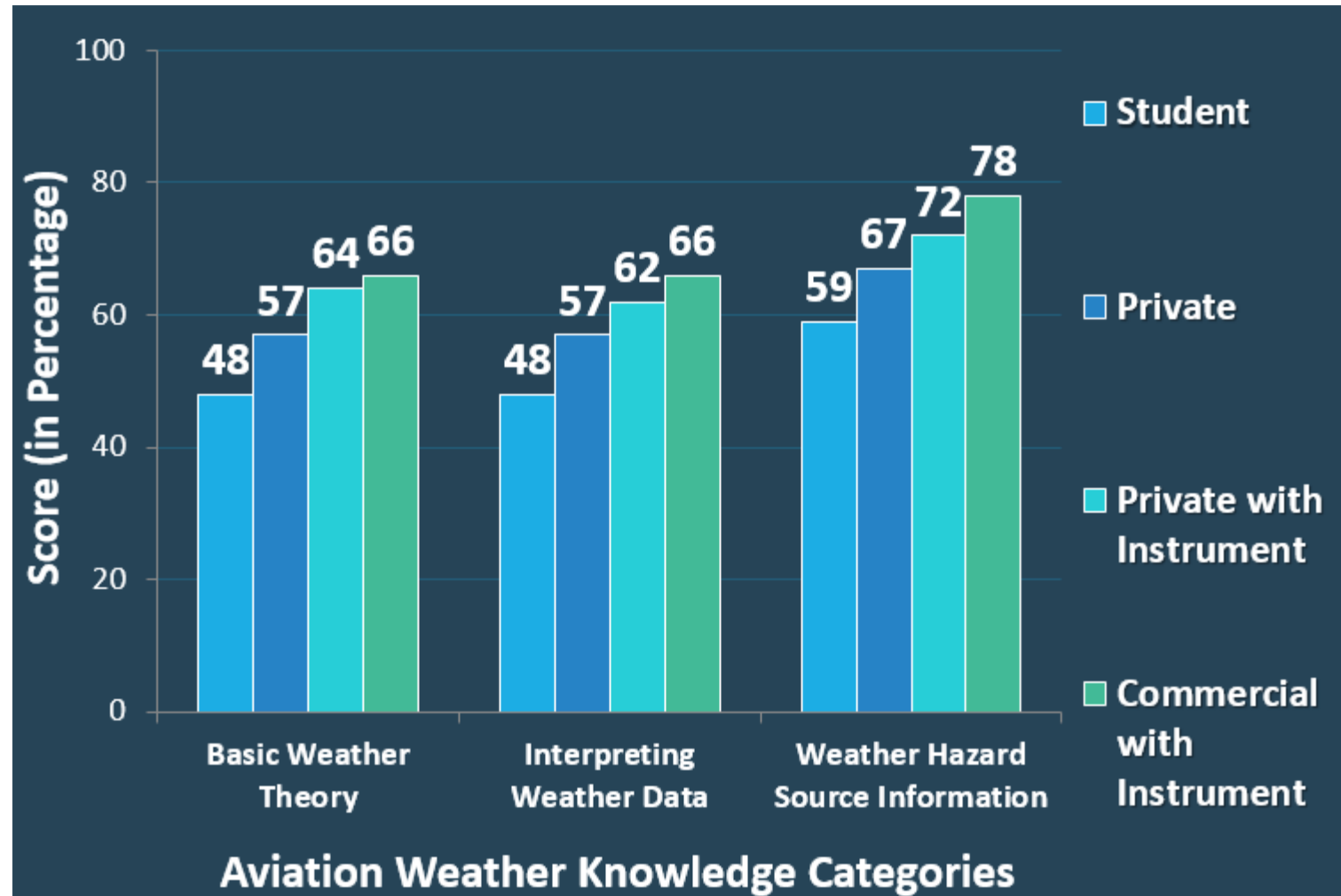
# Basic Weather Theory, Product Interpretation, & Weather Product Sources

- Weather product sources was one of the highest scores

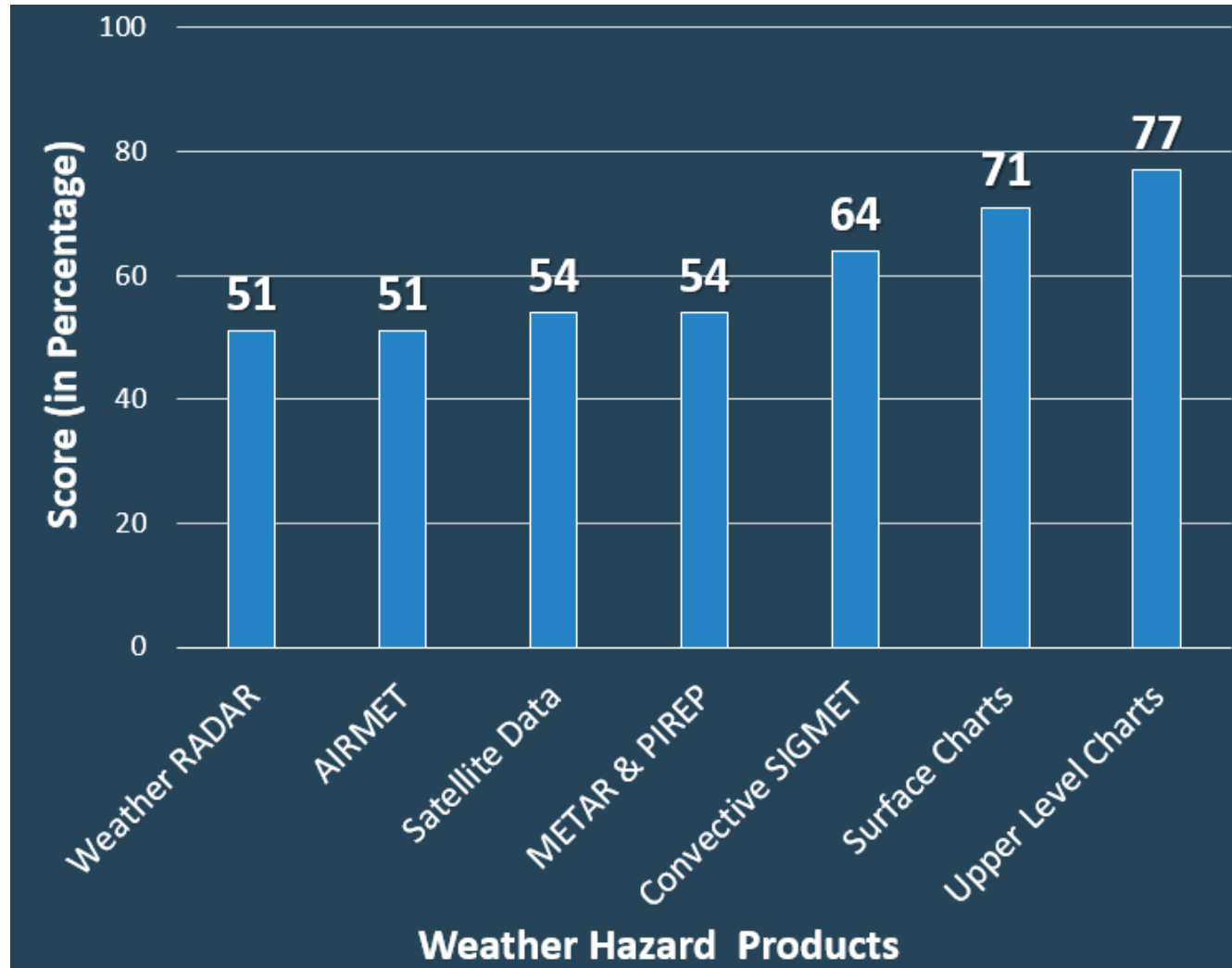


# Impact of Flight Experience on Pilots' Aviation Weather Knowledge

- Scores increased with more flight experience

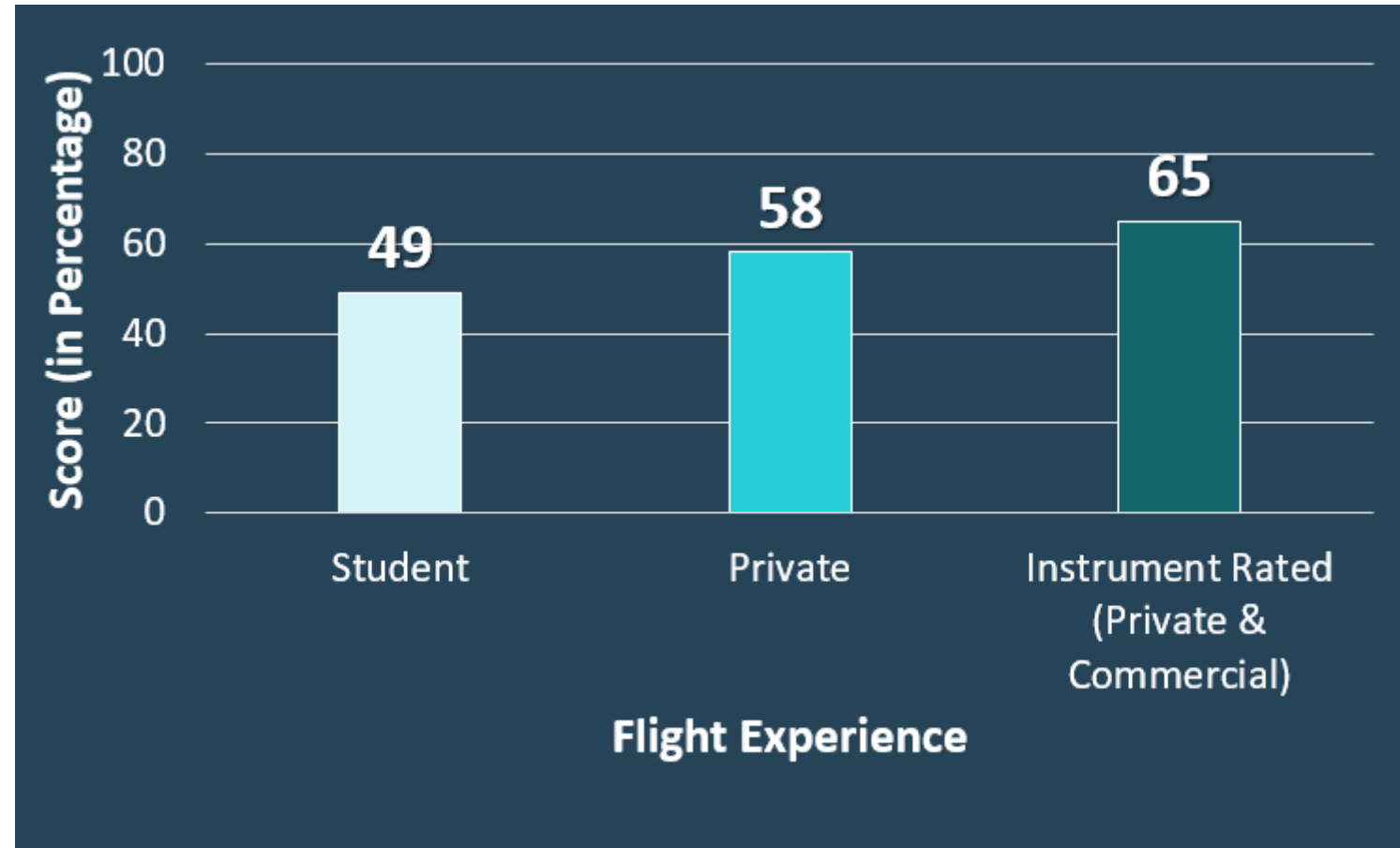


# Weather Hazard Product Interpretations



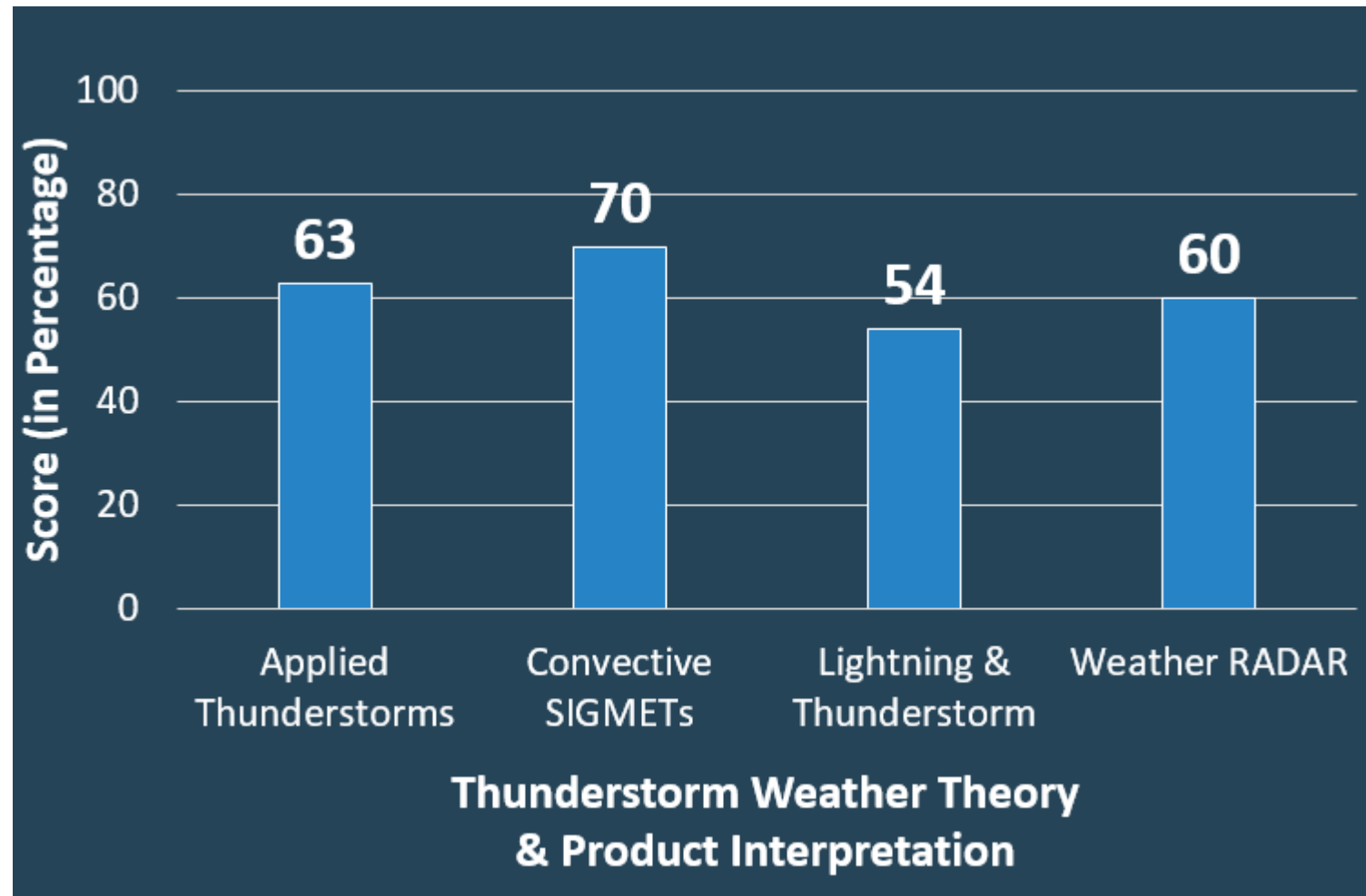
# Pilot Performance on IMC and VFR Knowledge and Skills

- This includes Surface Charts, Satellite Data, & PIREPs involving IMC weather



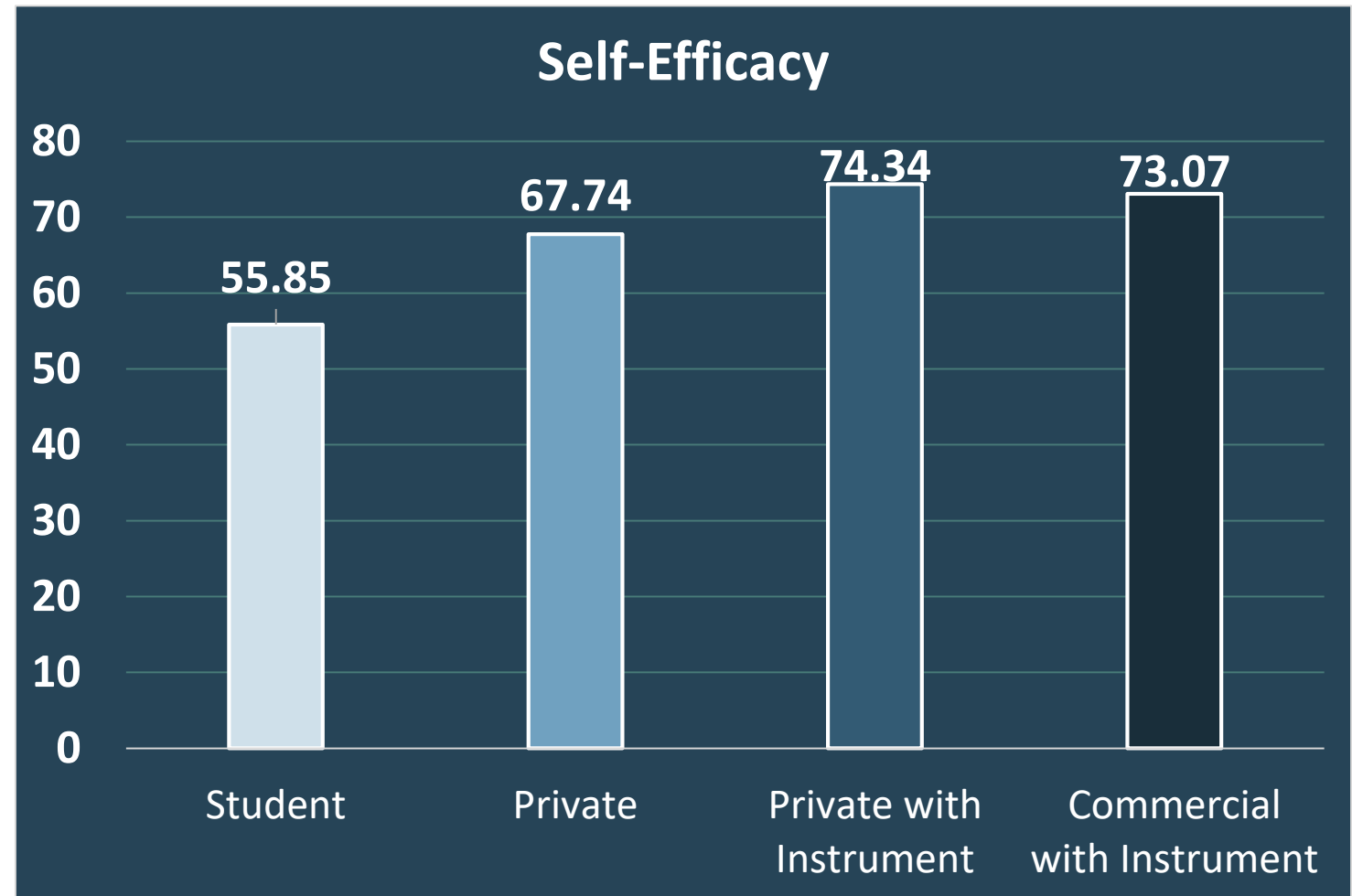
# Thunderstorm Knowledge and Skills

- Pilots scored low on thunderstorm principles and radar interpretation



# GA Pilots' Self-Efficacy

- Confidence level on weather topics
- Measured through a survey
- Positive correlation between knowledge scores and self-efficacy



# Overall Summary

- General Aviation Pilots are weak in terms of weather knowledge
- Weakest Topics included
  - Thunderstorms
  - Radar interpretation
  - AIRMETs
  - ....and more
- The new automated weather products showed effectiveness through higher scores



# Overall Summary

- The sample was 204 pilots – more participants will be needed to further verify the results
- More experience (flight hours) did relate to improved scores
- Weather self-efficacy was correlated positively with aviation weather knowledge.

# Why the Knowledge Gap?

- Pilots can fail every weather question on FAA knowledge test and still achieve a passing score
- Lack of experience
  - GA pilots avoid flying on thunderstorm days?
- Convective weather and radar interpretation can be complex
- Lack of understanding of weather from instructor passed on to students?
- More instructional tools and focus needed on weather topics for GA pilots
- Consolidate weather info and ACs into a “Weather Handbook”

Thank you

