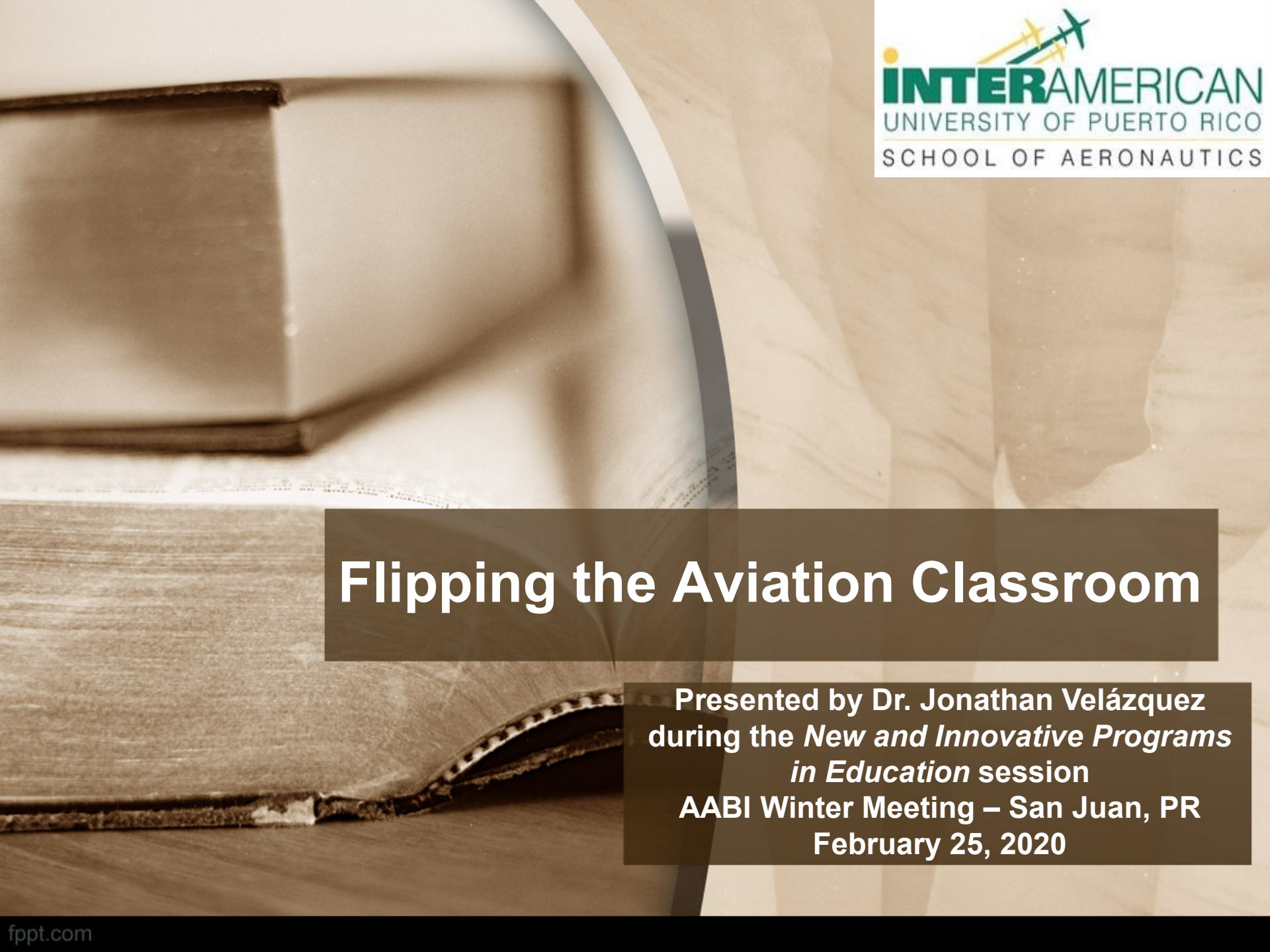

INTERAMERICAN
UNIVERSITY OF PUERTO RICO
SCHOOL OF AERONAUTICS

Flipping the Aviation Classroom

Presented by Dr. Jonathan Velázquez
during the *New and Innovative Programs in Education* session
AABI Winter Meeting – San Juan, PR
February 25, 2020

Flight Plan

- AABI Accreditation meets new Campus Educational Philosophy
- What is a flipped classroom?
- How are we flipping? Real life examples…
  - Debates and Guided Discussions
  - Technology and gamification of learning
  - Collaborative learning (including T-P-S)
- Research Results, personal experiences, and student testimonials

Our Campus Philosophy

Convinced that education leads to freedom, encourages the search for truth and promotes happiness, the Bayamon Campus adopts an educational philosophy based on the student as the center of the teaching-learning process, both inside and outside the classroom. In this educational process, the faculty members are facilitators, that is, they arouse students' curiosity and desire to learn and respect and recognize the potential of each individual. This philosophy will emphasize the generation and dissemination of relevant knowledge, in order to make valid contributions to society. (IUPR, 2015)

Our Campus Philosophy…

- Use of technology
- Collaborative learning
- Research
- Learning spaces
- Faculty development
- Innovative Teaching-Learning Strategies

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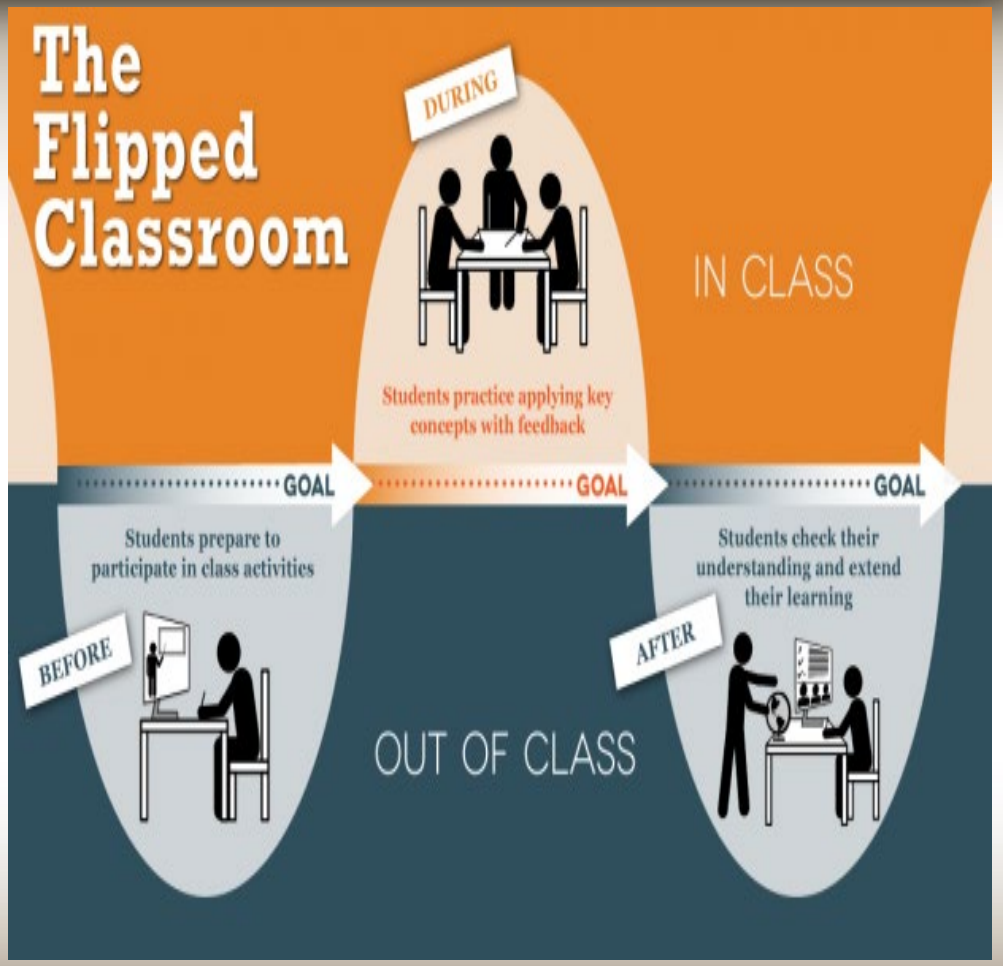
What is flipping?

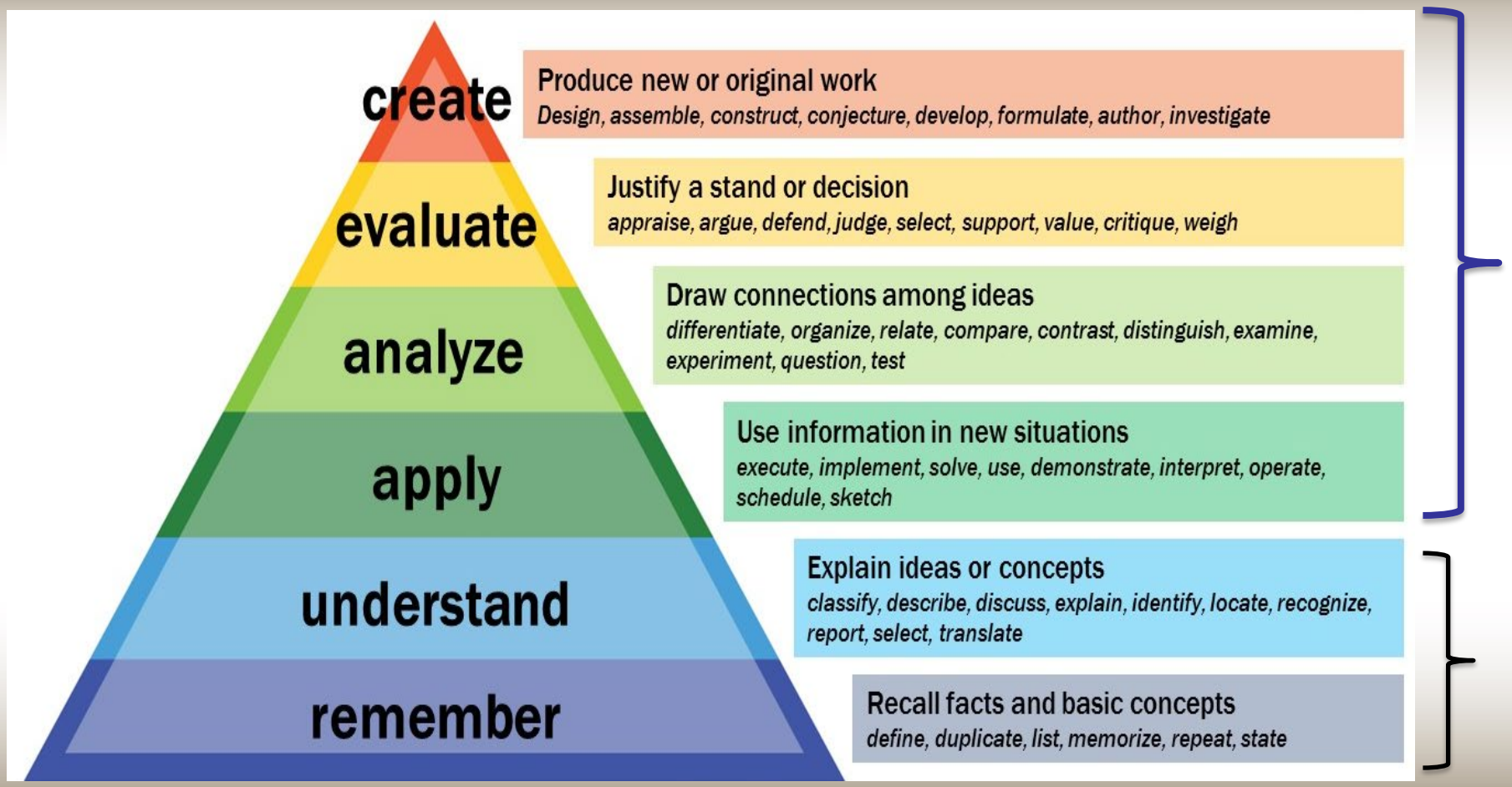
In a flipped classroom, the typical **lecture and homework** elements of a course **are reversed**. Readings and lectures are pre-done by students at home, while classroom sessions are devoted to exercises, projects, or discussions.

Other definitions for flipped classrooms

- Moving from an instructor-centered learning environment to a student-centered learning environment.
- Shifting from individual to collaborative tactics
- Focus on the student
- May or may not include technology



Flipping for Bloom's taxonomy



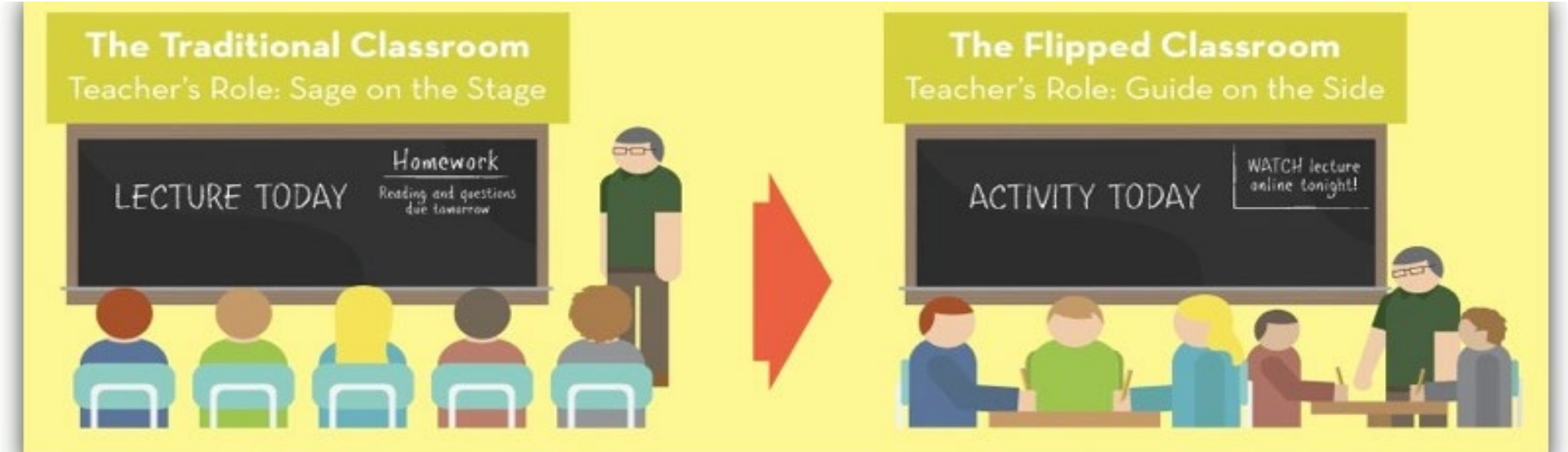
What type of Pre-work is good for flipped classrooms?

Before class

- Watching a video
- Reading material
- Podcasts

Ensure Pre-work by:

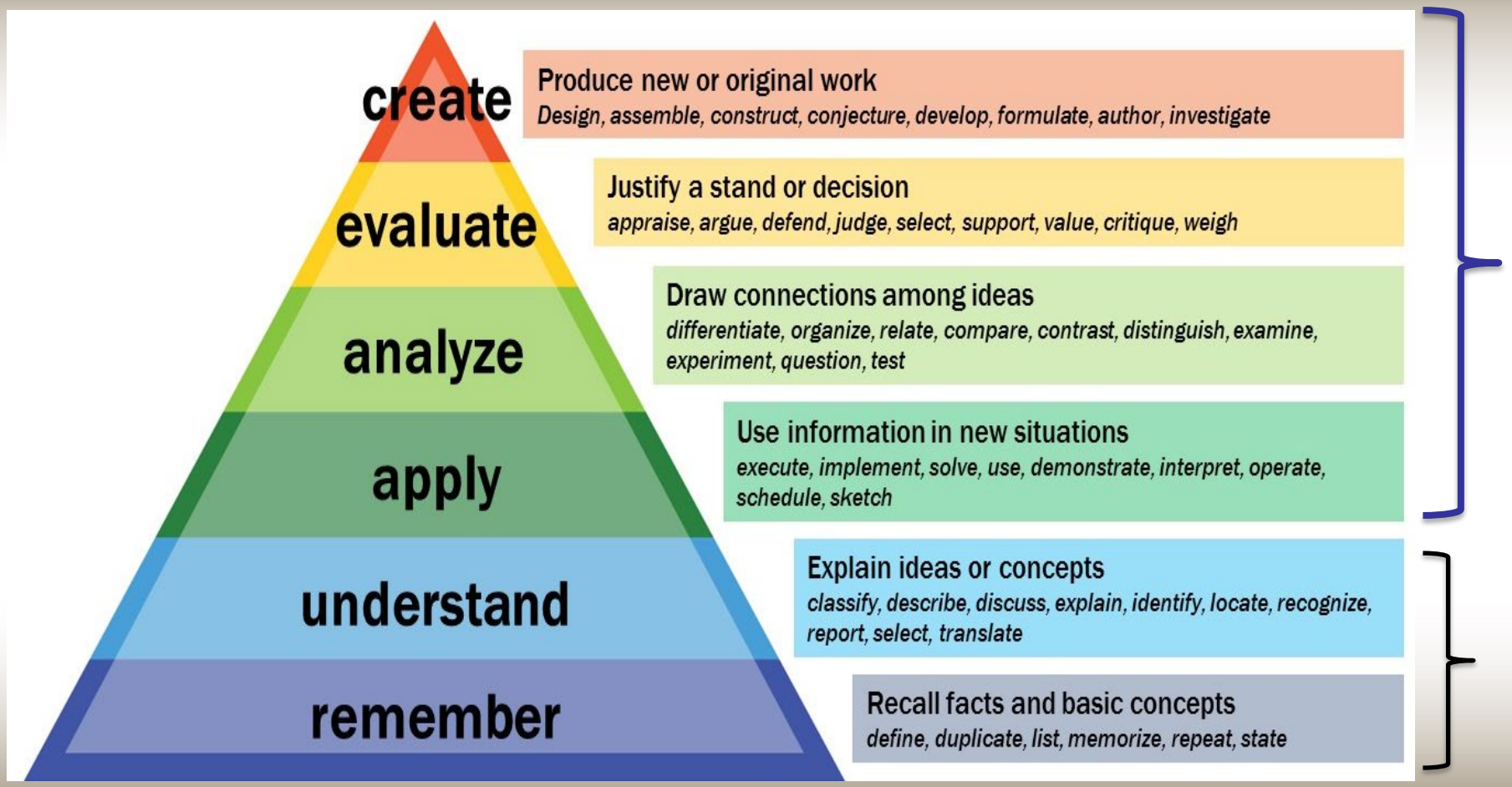
- Short journal responses
- Short essays
- Short quizzes



Example 1: Aviation History **Lesson**: Airline Deregulation 1978

- **Debate**: Was the Airline Deregulation Act a Success or a Failure?
- **Pre-work**:
  - Video (YouTube)
  - Talking points (research) : What does regulation / deregulation mean? Effect on Competition? Economic impact. Service (Routes / Passengers) Aviation Safety. Labor Service / Relations. Airline Fairs. Market entry and Airline Profits
  - Write a 250-word essay supporting your argument

Flipping for Bloom's taxonomy



Example 2: ERAU's Aviation 101

- Free
- Self-paced
- Video lessons
- PDF summaries
- Online quizzes per topic

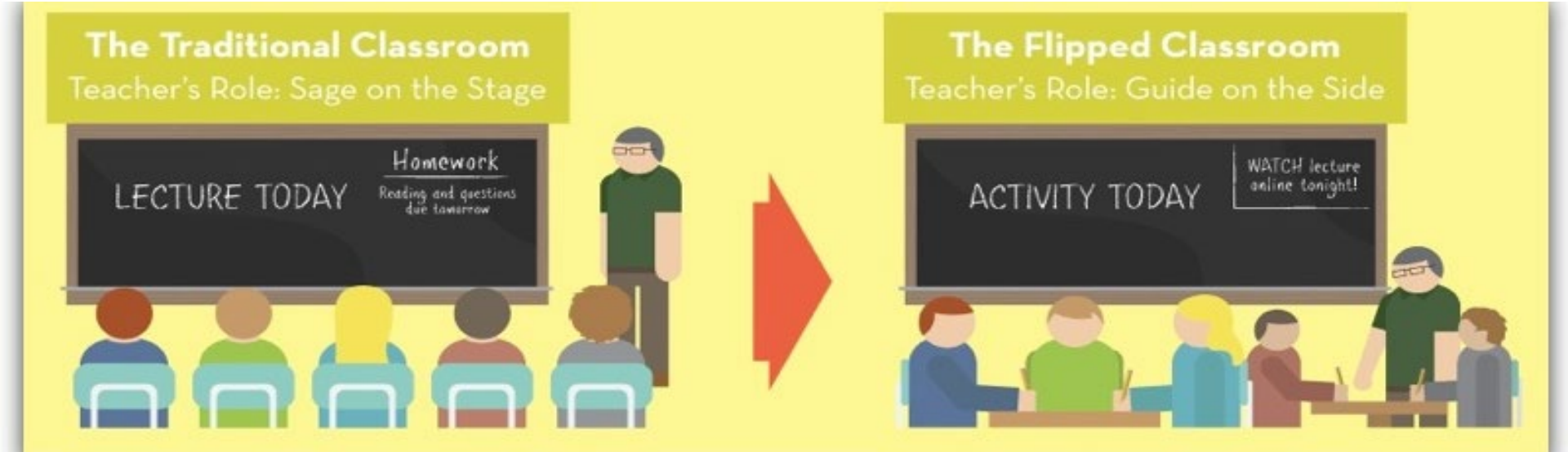
What type of Pre-work was performed?

Before class

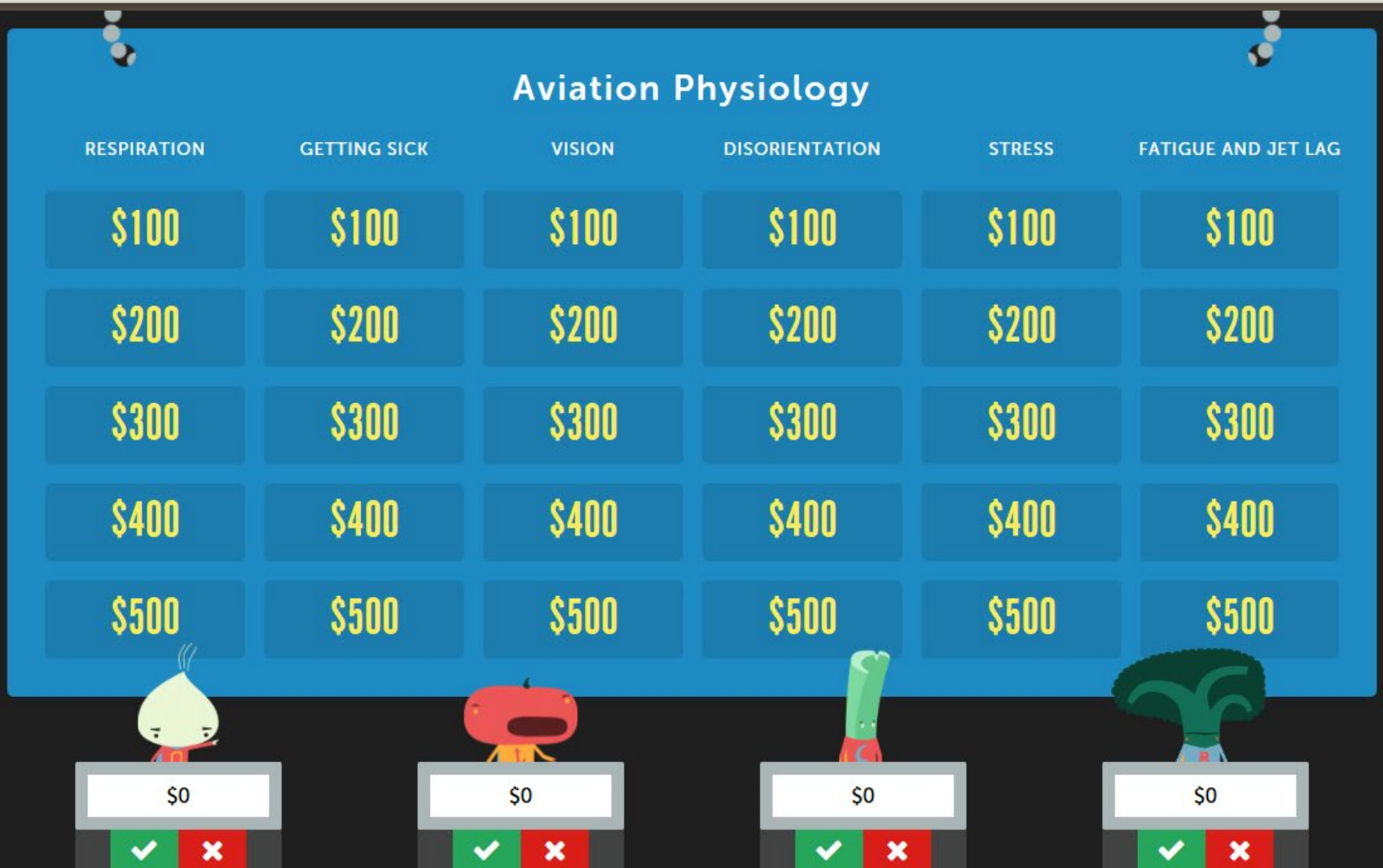
- Watch a video lesson
- Answer short quizzes

Ensure Pre-work by:

- Submit results to me



Example 3: Guided Discussions
Lesson: Aviation Physiology



Active learning strategies that are supported through flipped classrooms

- **Inquiry and Problem-based learning**: students answer questions and solve problems
- **Case-based teaching**: case studies of historical / hypothetical situations that involve solving problems and/or making decisions
- **Guided Discussions**:
  - Debates
  - Tournaments (Jeopardy)
  - Heavy dialog and student questioning

Research Questions

- Will there be a significant difference in final exam scores between students experiencing a flipped course (with the aid of the MOOC) versus those students undergoing traditional class lectures?
- Is there any significant correlation between taking the course with the MOOC and passing the course (receiving a grade of C or better)?

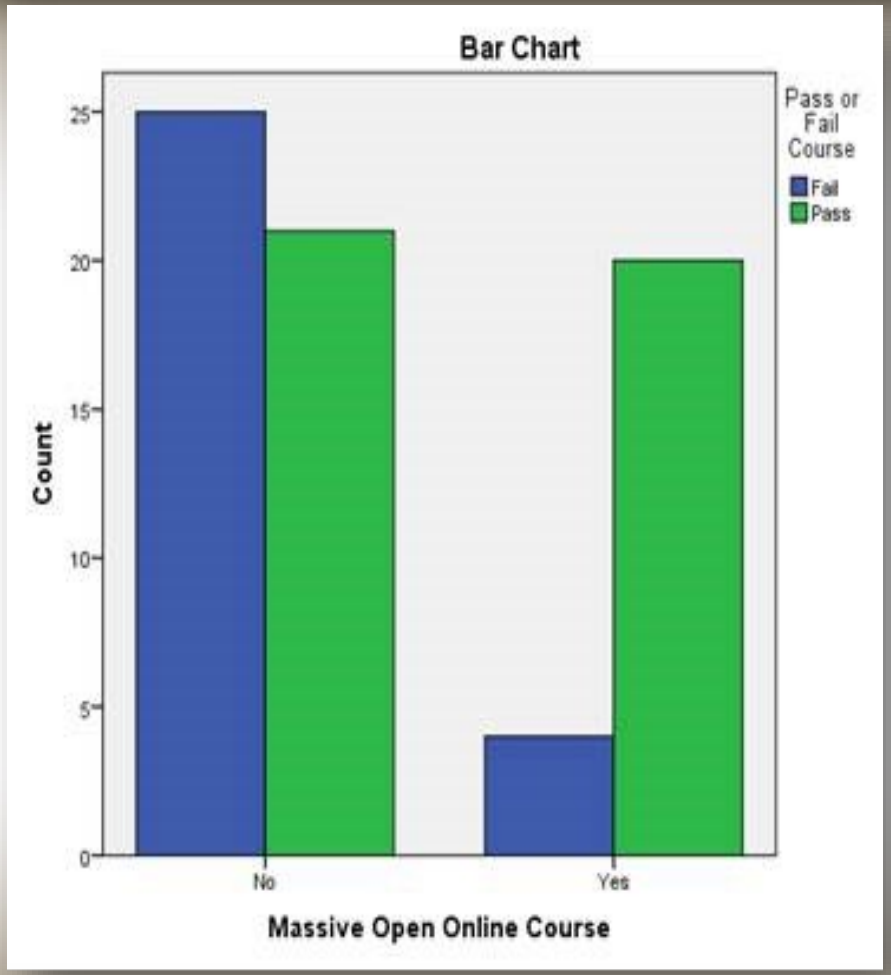
Hypotheses

- $H_0$1: There is no statistically significant difference in *final exam scores* between students experiencing a flipped course (with the aid of the MOOC) versus those students undergoing traditional class lectures.
- $H_0$2: There is no relationship between a *student's course outcome (passing or failing)* and taking the course assisted by the MOOC.

Results 1st Research Question

- Student participants of the MOOC, and the flipped learning instruction, achieved significantly higher final exam scores (M = 79.68, SD = 10.52, SE = 2.41) than those who received traditional class instruction (M = 72.63, SD = 12.00, SE = 2.09), $t(50) = -2.13$, $p < .05$.

Second Research Question



A moderate correlation was found, $r = .36$, $p < .01$, between a student's course outcome (pass or fail) and taking the course assisted by the MOOC

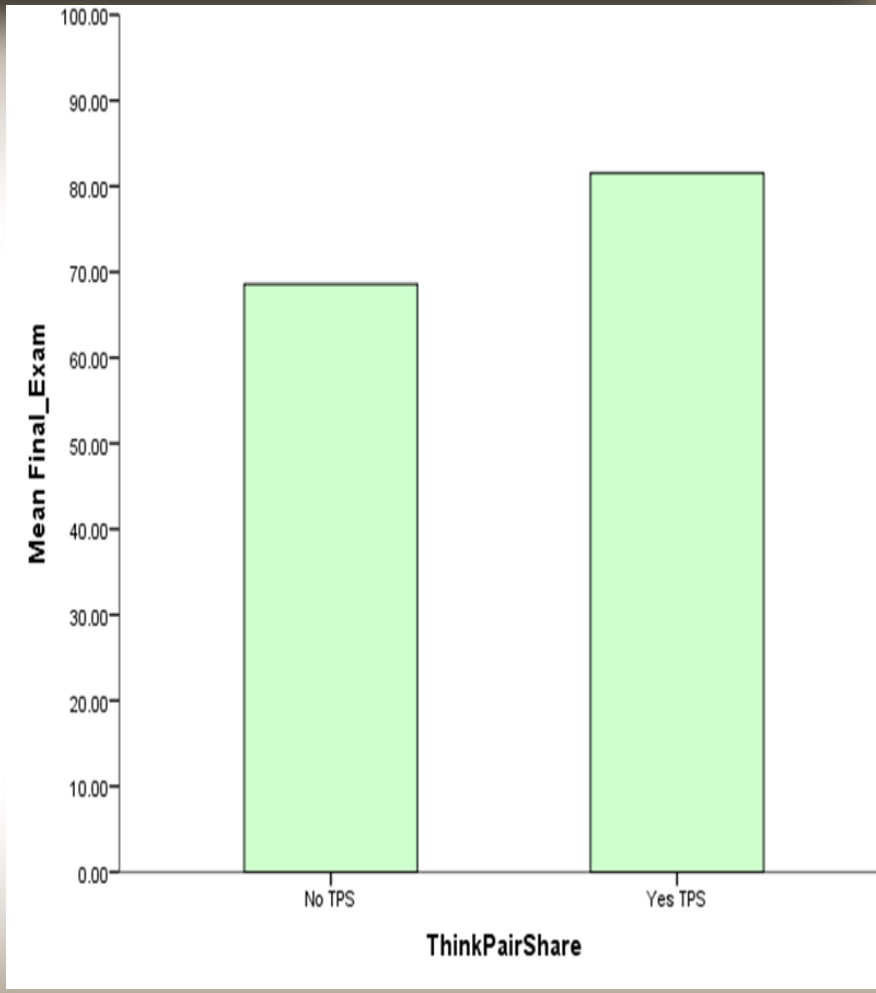
Think-Pair-Share (TPS)

Research Questions / Hypothesis

- Will there be a significant difference in final exam scores between students experiencing a flipped course (with the aid of the T-P-S) versus those students undergoing only the flipped classroom technique?
- $H_0 3$: There is no statistically significant difference in *final exam scores* between students experiencing a flipped course (with the aid of the T-P-S) versus those students undergoing only the flipped classroom technique.

Results and Experience

Student participants of the flipped learning instruction, including T-P-S, achieved significantly higher final exam scores (M = 81.52, SD = 8.869, SE = 1.77) than those who only underwent flipping (M = 68.57, SD = 13.40, SE = 3.58), $t(37) = -3.63$, $p < .001$.



What are students saying?!

- *“What I like the most about this technique is that it allows us to learn more on subject before we actually discuss it in class, allowing us to further 'connect the dots' in class, and retain that information. I do not have any complaints on it.”*
- *“It allowed me to have an idea of what the material was before taking the class, so I wasn't lost when the material was given.”*

What are students saying?!

- *“I really enjoyed your class and I don't recommend that you change anything about the class or your teaching style. “It allowed me to have an idea of what the material was before taking the class, so I wasn't lost when the material was given.”*
- *“…class information is better processed and absorbed. I can't say anything negative about this technique.”*
- *“I could learn on my own at home and study.”*

What are students saying?!

- *“I feel the flipped classroom technique is the future of teaching and I very much enjoyed the way the course was given.”*
- *“I love this technique because we [could] anticipate what [was] going to happen in the classroom.”*
- *“…you came to class with an idea of what you're going to learn. […] therefore when it's time for the [..] class, the student is adding to what they had previous learned*

In summary…

- The advent of AABI and the new *Campus Educational Philosophy* has resulted in a student-centered approach to instruction and an improvement in academic performance

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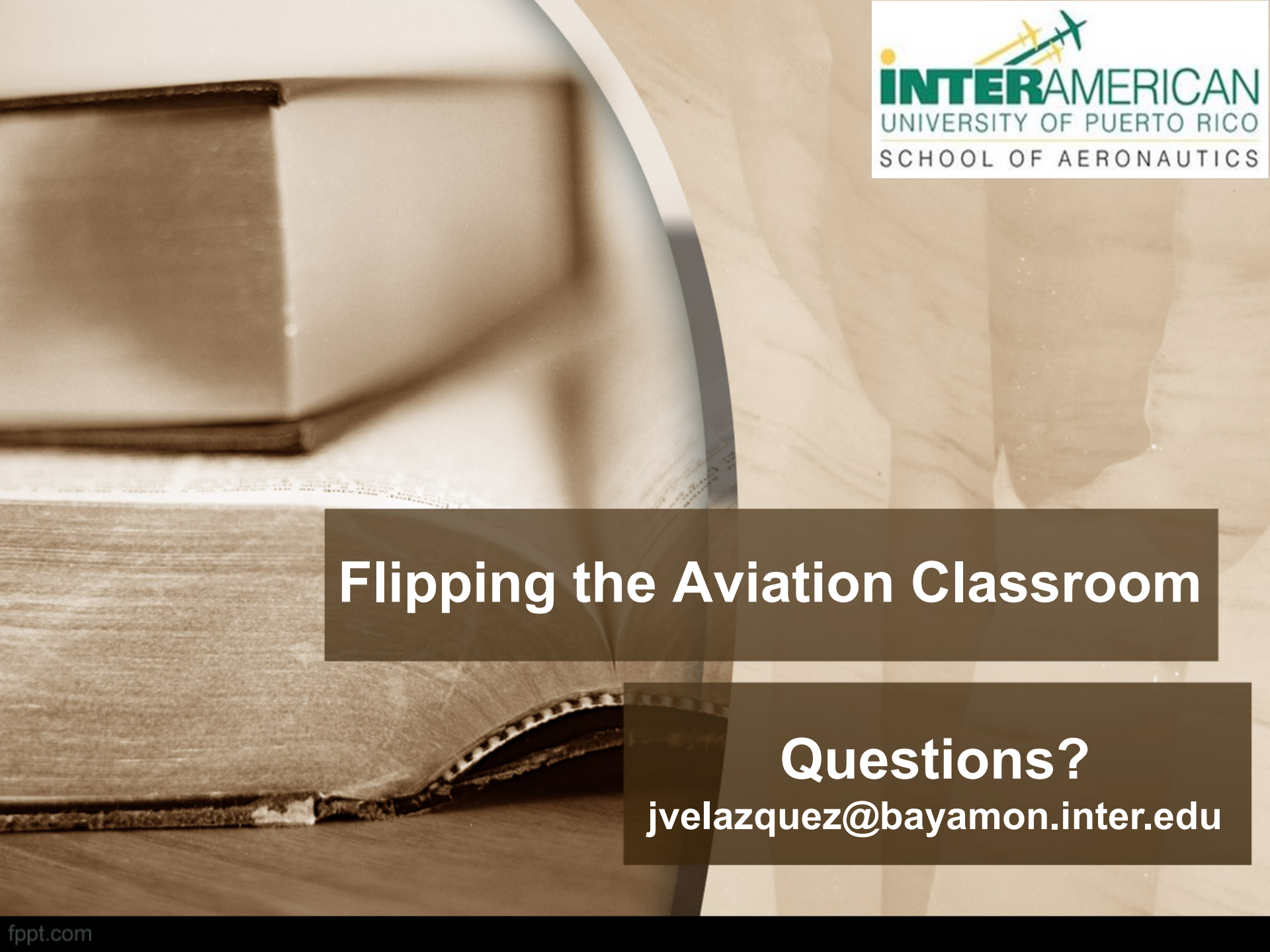
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