Innovative Active Learning Environment for Middle School Students

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Outline

- Background
  - Target population

- Project Description

- Results & Discussion

Target Population

- 7-8 grades students from groups underrepresented in STEM

- Rural school district
  - 97% population African American (State – 33%, US – 15%)
  - Only 60% classes taught by highly qualified teachers

- Economically depressed communities

  - Median Household Income: 60th /67 Counties

  - Students eligible for free or reduced lunch: 68%, State 51%

AL State Education Report Card

- National Assessment of Educational Programs Report (2016)

8th Grade	Below Basic	At Basic	At Proficient	At Advanced
All	44%	38%	14%	3%
URM	67%	28%	4%	-

- Career and Technical Education: 6% passed AHSGE Math component

- Math Performance at or above proficient

	Elementary	Middle	High
AL	48%	38%	27%
Project Population	31%	13%	5%

- Only 2.7% take SAT (State - 27%)

Project Description

- Goal
  - Engage, motivate and increase the self efficacy of middle school students in STEM through the use of an innovative active learning environment

- Objective
  - Develop teaching/learning modules for 7-8 grade math/science concepts aligned with AL COS using flight simulation software.

Why Flight Simulation Software?

Engaging   Realistic   Motivating

Approach

- Identify challenging concepts through meetings with school teachers

- Determine compatibility of identified concepts with flight sim activities

- Develop lesson plans, activities (paper/pencil and flight sim)

- Conduct professional development for teachers (one-week)
  - Refine lesson plans/activities based on teacher feedback

- Conduct summer camp for 7-8 grade students (one-week)

Typical Lesson

- Basics

- Paper/Pencil activity

- Flt Sim activity
  - Mission
  - Data Extraction
  - Data Plotting
  - Data Analysis

Activity

From the graph complete the following table:

Time to Touch Down Seconds (T)	Height of the Aircraft Above Ground (H)	H/T	H-T
180			
120			
60			

Do you notice any pattern for ratio H/T and the difference H-T?

2. Can you write a relationship between distance and time? Note this formula is for the vertical speed or also called the rate of descent.

3. Without using the graph, determine the height of the aircraft (using the formula found from the previous question) when it is
(i) 80 seconds away from touch down?

(ii) 40 seconds away from touch down?

Assessment Instruments

- Teachers Pre/Post Attitude Surveys (MTEBI, STEBI)

- Students Pre/Post Content Tests

- Students Pre/Post Math and Science Attitude Surveys

- Teachers Post Camp Survey

- Students Post Camp Survey

Characteristics of Our Model

- Active learning

- Connection between classroom and real life

- Group activity

- Near-peer mentoring by undergraduate students

Questions?