

# *Flights of Innovation*

## The Future of Flight Foundation Education Program

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# Who We Are:

The Future of Flight Aviation Center & Boeing Tour debuted in December 2005. The Boeing Company, Future of Flight Foundation, Snohomish County Public Facilities District and the Snohomish County Airport (Paine Field) joined forces to create a unique interpretive center so visitors could glimpse the future of commercial aviation. The \$23-million Future of Flight project represents a dynamic public/private/nonprofit partnership. Its mission is to engage the visitor in the wonder of flight - from the astonishing miracle of powered flight itself to the impact of commercial aviation on humanity around the globe.



# Our Vision:

The Future of Flight Foundation gives wings to innovative thinking

- The Future of Flight Foundation highlights aviation and creates experiences that engage participants to:
- Cultivate curiosity
- Stimulate imagination
- Encourage creativity and experimentation
- Generate collaboration
- Explore solutions

# Our Program:

## *“FLIGHTS OF INNOVATION”*

### **Principles of Instruction**

- Constructivist Learning
- Problem-Based Learning
- Socratic Questioning
- The Metacognitive Process
- Professional Learning Communities

# Instruction:

## **Constructivist/Constructionist Learning**

### **Constructivism**

- Learning is active and social
- Each learner is a unique individual
- Each learner builds new learning on previous knowledge or experience
- Each learner is responsible for their own learning
- Motivation to learn is directly related to the learner's confidence in his or her perceived potential to learn
- The instructor functions as a facilitator who supports the learner in becoming an effective thinker.

### **Constructionism**

- "The word constructionism is a mnemonic for two aspects of the theory of science education underlying this project. From constructivist theories of psychology we take a view of learning as a reconstruction rather than as a transmission of knowledge. Then we extend the idea of manipulative materials to the idea that learning is most effective when part of an activity the learner experiences as constructing a meaningful product." (Papert, Seymour, 1987)

# Instruction:

## **Problem-Based Learning**

Problem-based learning (PBL) is an instructional strategy in which students actively resolve complex problems in realistic situations.

- It is focused on experiential learning organized around the investigation and resolution of messy, real-world problems.
- The activity is grounded in a general question about a problem that has multiple possible solutions and methods of addressing the question.
- Learning is driven by the context of the problem and is not bounded by an established curriculum.

# Instruction:

## **Socratic Questioning:**

Socratic questioning helps students to think critically by focusing explicitly on the process of thinking. During carefully structured questioning, students must slow down and examine their own thinking processes (i.e., reflective thinking). Thoughtful, disciplined questioning in the classroom can achieve the following teaching and learning goals:

- Model scientific practices of inquiry
- Support active, student-centered learning
- Facilitate inquiry-based learning
- Help students to construct knowledge
- Help students to develop problem-solving skills
- Improve long-term retention of knowledge

(B.G. Davis, 1993)

# Instruction:

Metacognitive strategies are essential for the twenty-first century because they enable students to cope successfully with new situations. Learners who are well developed metacognitively:

- Are confident that they can learn.
- Make accurate assessments of why they succeed in learning.
- Think clearly about inaccuracies when failure occurs during tasks.
- Actively seek to expand their repertoire of strategies for learning.
- Match strategies to the learning task, making adjustments when necessary.
- Ask for guidance from peers or the teacher.
- Take time to think about their own thinking.
- View themselves as continual learners and thinkers.
- (NCREL, 1995)

# Professional Learning Communities

- Cross-District Collaboration
  - Teachers talking with other teachers about shared experiences related to the curriculum and to the instructional strategies
  - Student to student collaboration about the scenario and possible solutions
- Peer Coaching
  - Teachers watching each other teach using unfamiliar instructional strategies
  - Teachers coaching parent volunteers in using unfamiliar instructional strategies
  - Students coaching students in problem solving strategies and following group norms
- Continual Improvement Model
  - Feedback from teachers and students informs changes in the program design and the implementation strategies

# *Flights of Innovation*

## VESIL<sup>©</sup> design

- VENUE-bringing formally designed learning into a place other than the traditional classroom.
- EXPERIENTIAL-learning is designed around experiences that approximate “real-life” situations.
- SCENARIO-the realistic situation and authentic work tasks, collaborations and activities that must be completed to successfully meet expected learning outcomes.
- IMMERSIVE LEARNING- the state of learning in which the students assume fully detailed character-roles and responsibilities, helping to complete the authentic setting.

# Our Gallery:



# Program Framework

- **Module 1- In the Classroom**
  - Exploration of Aviation Related Careers
  - Write Resumes
  - Apply for Jobs
  - Form Teams
  - Develop Team Norms
  - Self/Team Assessment
- **Module 2- Future of Flight Site**
  - Collaborate with teams to research issues using the exhibits as basis for ideas
  - Design presentations to share accrued knowledge with the whole group
  - Introduction of main scenario project
  - Self/Team Assessments
- **Module 3- Return to Classroom**
  - Continue work on main scenario project
  - Final Presentation
  - Self/Project Evaluations

# The Scenario

- The Impact of Global Warming On Aviation:
  - Bowerman Field in Hoquiam Washington is at risk of flooding due to rising sea levels. What solution(s) would you offer to the Commissioners' of the Port of Gray's Harbor and Bowerman Field?

# Bowerman Field in Hoquiam, WA



# Implementation Data

- Piloted Fall of 2009
  - 4 Schools from 4 Local School Districts Partnered
  - 211 Sixth, Seventh and Eighth Grade Students
  - All schools had high Free/Reduced Lunch Population
  - 2 of 4 Schools have 40% or higher population of English Language Learners
  - 1 Core Math/Science Teacher
  - 1 Core Math Teacher
  - 1 General Studies/Special Education Teacher
  - 1 Communications /AVID Teacher
  - 1 English /AVID Teacher

# Implementation

- 100% Grant Funded
- 5 Major Partners
  - Center for Excellence
  - Edmonds Community College
  - Boeing Commercial Airplane Co.
  - City of Mukilteo, WA
  - Puget Sound Energy
- Program is implemented at no cost to the schools or districts (including substitute costs and transportation)

# Our Venue:



# Efficacy

## Student Testimonials:

Q. What would you like us to know about how you have been impacted by participating in the Future of Flight project?

- A. *Well, I just liked watching our ideas grow from paper to a design and how others think.*
- B. *I would like them to know I learned that I could actually work hard but still have fun also that I need to work at a faster pace next time I do a project with the class.*
- C. *It helped me because I learned a lot of new ways to problem solve.*

# Efficacy

\*We are just beginning to process data:

62% of the students in the first two classes, who took both the pre-test and the posttest showed improved scores.

The average raw score on the pre-test was 11 (total possible 50)

The average raw score on the post-test was 31 (total possible 50)

# Bibliography

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