Motivation:

1. Virtual Reality and Environment
   - PC Virtual Reality feasible with Game Engines
   - Data Simulations of Geo-Spatial information
   - Known transfer from simulations to real world tasks

2. Real World Situated Learning
   - Observations as a volunteer and parent
   - Beechwood Nature Camp at the Audubon Society of Western Pennsylvania
   - Spontaneous lesson: Food or poison?
   - Audubon “Natural Communities” curriculum
   - Situated Learning Theory - Lave, 1990
   - Theory of Multiple Intelligences - Gardner, 1993
   - Informal Learning - Crowley, 2002
   - Episodic Memory - Janet Kolodner, 1983

3. Research Question
   - Information Science view of direct learning – Gibson, 1979
   - Intersection of knowledge acquisition systems, geo-spatial simulations of nature, and child-centric user interfaces.
   - Extreme personalization… each child, each experience is unique and a perfect fit.
   - Central to this research is the investigation of the interplay of salience, semantics, emotions, aesthetics and memory

4. Experimental Methods
   - Pre-experimental user profile survey
   - Two groups, Real-Virtual and Virtual-Real
   - 2x2 ANOVA, counterbalanced design.
   - In-situ data gathered by student marking a map for “anything that is personally important”.
   - Flowers factual data presented or selected
   - Free-choice to stop at anytime.
   - Posttest on facts and concepts
   - Post-experimental comparison attitudinal survey

Our Approach:

1. Sound HCI techniques: Activity Study
   - Approached the problem from bottom-up
   - What were the Child’s goals?
   - How to maintain intrinsic motivation?
   - How to support learning as a self directed act?
   - How to support independent exploration?
   - How to support spontaneous inquiry?
   - Facilitate learning, understanding & knowledge acquisition
   - Encourage full synthesis, evaluation and creation with microworld activity

2. Design, Prototype, Test and Build Virtual World
   - Built a statistically ecologically accurate, and visually true to life, photo-realistic, 3D computer graphic model of a real environment.
   - Study One: Real vs. Virtual
   - Study Two: 2x2 ANOVA for visual fidelity and navigational freedom

Future Research:

Investigate other questions

- Unpack the User Interface Design parameters that impact attention, curiosity, exploration, inquiry, emotions and learning of scientific material and acts of creation for the child.
- An emotional sense of awe and wonder.
- Aesthetics in terms of “Beauty” as User Interface Design factors.