Innovations in Web-Based Informal Science Education: 

*DinoQuest Online*

Robert Nideffer, University of California, Irvine, UCGame Lab, Studio Arts Dept.
Walt Scacchi: University of California, Irvine, UCGame Lab, Institute for Software Research
Science Learning Games

- Distance learning via Web,
- Expands on science topics,
- Based on CA Science Education Standards
- In-depth science missions that complement DinoQuest exhibit at Discovery Science Center
- Earn points and Dino DNA by completing missions.
Project Contributors

- **DSC** – Janet Yamaguchi (VP Education), JoeAnna Jenkins (CFO), Kellee Preston (VP Operations), Leslie Perovich (VP Marketing), Creative Kingdoms Inc., and others

- **UCI** – Robert Nideffer (creative director), Alex Szeto (game programming and art), Calvin Lee (database programming), Celia Pearce (design contributions)
UCI Game Lab Partners and Sponsors

- California Institute for Telecommunications and Information Technology: Calit2 at UCI-UCSD
- San Diego Supercomputer Center (SDSC) at UCSD
- UCI Center for Graphics, Visualization and Imaging Technology
- UCI Institute for Software Research
- UCI Arts, Computation, and Engineering (ACE) Program
- UCSD Experimental Game Lab
- Calit2 ACTION Laboratory
- Discovery Science Center, Santa Ana, CA
- Global Center for Research and Development, Daegu, Korea
- National Science Foundation
- Sun Microsystems
- UC Humanities Research Institute
- and others

For further information, see http://ucgamelab.net
DinoQuest Online (released in late September)

- Log in with password online or from DSC
- Go to each collaboratory

- Same scientists as DinoQuest at DSC
- Expand upon science education standards in each lab
Multiple Science Learning Games: Dinosaur Dig Field Site Collab Game

- Different objectives for each game.
Multiple Science Learning Games:
Science Education Content

Backbones and Ribs
Vertebrae provide structure for the animal and are divided into sections depending on where they are located along the back. Thoracic vertebrae are in the chest area and provide attachment points for the ribs. Ribs make up a bony case that protects many important internal organs, such as the heart and lungs. Bony projections on the vertebrae are attachment points for muscles. The Apatosaurus, being more massive, had larger processes on its vertebrae than the Allosaurus. Many of the larger dinosaurs, such as Apatosaurus and Allosaurus also had "belly ribs," called gastralia, that were not attached to the backbone or the other ribs. The purpose of the "belly ribs" are not specifically known.

In 1987, amateur paleontologist Stan Sacrison discovered "Stan," a T-rex embedded in the Hell Creek Formation in South Dakota. 199 fossilized bones were recovered, including the best preserved and most complete T-rex skull ever found. Stan's bones showed evidence of healed injuries: broken ribs and vertebrae, damaged facial bones, and a large hole in the back of its skull.
Multiple Science Learning Games: Zoology/Systems Collab Game

- Build a working digestive system out of available organs and “connectors”
- Move Oxygen and CO2 through a cardio-pulmonary system
Multiple Science Learning Games: Ecology/Habitat Collab Game

• Gain points by matching prey/predator and food chain relations via *Tetris*-like game play
Multiple Science Learning Games: Biomechanical Collab Mini Games

- Mass and balance
- Proportion and speed
- Matching anatomical structures to diet
Multiple Science Learning Games: Resource Interaction Collab Game

*MyLab* - shows missions completed both online and at the Science Center

*DinoSphere* – will allow building of your own Dinosaur with DNA collected from missions.

Go back online or to Science Center to obtain different DNA by completing more missions!
Evaluation Potential

DinoQuest and DinoQuest Online allow for the following evaluations:

*Player Centered:* scores and missions completed identify progress and provide feedback in context.

*Exhibit Centered:* ability to test content comprehension by player quiz upon completing mission.

*Independent Evaluation:* to ask which method is best and why: physical exhibit, online learning games, or both?
Cyberinfrastructure for Science Centers

Tier 1: Individual player connection: your internet connection at home.
Tier 2: Local institutional player connection: library, science center, school.
Tier 3: Regional science center provides local exhibit content connected online.
Tier 4: “Gateway” science centers provide open interfaces and content.
Tier 5: Science Center Grid: Massive Multiplayer Online Science Learning Games
Cyberinfrastructure for Science Centers

Cyberinfrastructure allows for:

- *Networked Science Centers* across the U.S. (and beyond).
- Can be applied in multiple scientific, technological, or engineering domains.
- Can be further developed and expanded with open source software components, infrastructure, and open content.
Thank You!

Robert Nideffer: nideffer@uci.edu
Walt Scacchi: wscacchi@ics.uci.edu