Augmenting Learning
Mobile Simulation Games for Learning

Eric Klopfer
MIT Scheller Teacher Education Program
Media Lab
The Education Arcade

Mobile Games

- Facilitate a new type of game
  - Don’t just port big games to the small screen - situate games
- Combining constructivist and situated learning paradigms.
- Mobile learning games can be:
  - Social
  - Authentic and Meaningful
  - Connected to the Real World
  - Open-Ended/Multiple Pathways
  - Intrinsically Motivating
  - Filled with Feedback
Learning Goals

- **K-16 - 21st Century Skills**
  - Engage in authentic science
  - Foster collaborative learning and communication
  - Capitalize on game play motivation
  - Solve complex problems with complex solutions
- **Informal Education**
  - Encourage deeper and broader interaction
  - Connect with real surroundings
  - Connect and collaborate with others
- **Training**
  - Promote teamwork and collaboration
  - Facilitate role playing
  - Provide new perspectives on real problems
  - Allow safe play

Augmented Reality

Computer simulation on handheld computer triggered by real world location

- Combines physical & virtual world contexts
- Embeds learners in authentic situations
- Engages users in a socially facilitated context
Heavy v. Light

• Imagine that MIT is...

Contaminated with a Toxin

An Underwater Aquarium

AR: Environmental Detectives

• First Example - Part of G2T
• “Environmental Detectives”
  • Players briefed about rash of local health problems linked to the environment
  • Need to determine source of pollution by drilling sampling wells, interviewing virtual witnesses
**Benefits of location basis**

- **We can make multiplayer online games that recreate the locations and problem-solving in AR games, BUT**
- **Communicating face to face** is different from online.
- **Ability to use the environment** differs
- **Different criteria are applied** in decision-making

**Outdoor AR: Features**

- **Scenarios can include one or multiple player roles**
- **Participants interview virtual characters** by walking to their real world location (audio, video, images and text).
- **Collect data** from underlying models using simulated equipment and gather information from items within the game.
- **Gates** allow participants in outdoor simulations to enter real buildings.
- **Collect evidence** for optional in-game conclusions or to prepare for off-line discussion.
Outdoor AR Toolkit

- Map-based tool
- Grab map from Google Maps
- Insert into map and GPS coordinates into game

AR Games’ Portability & Customization

- Across wide range of subjects...
  - Public Health/Disease Outbreak (Charles RiverCity & Avian Bird Flu)
  - Forensics (Mad City Murder)
  - Historical Exploration (Battle of Lexington)
  - Mathematics (Alien Contact)
  - Economics (Hip-Hop Tycoon)
- ...across locations
  - Local Communities (e.g., geographical tours)
  - Schools
  - Museums
  - Science Centers
  - Zoos/Nature Conserves
- ...and across time
  - Beyond normal “class time”
  - Over extended period of time
Mystery @ The Museum

Analyze

Communicate

Investigate

Decide

Mysterious Game Play

Parents and Kids Collaborating

Fostering Collaboration Through Roles

Using Contextual Information

Collecting Virtual Samples
**POSIT**

Game is focused around a single yes/no policy question (fictionalized). For example, “Should we build a biohazard level 4 research facility in our community?”

- **Briefing** - Potential biohazard facility in Boston
- **Roles** - Playing realistic roles from scientist to resident
- **Initial Opinion** - Opinions “in role” are registered
- **Collecting Data** - Players collect information from virtual characters, and real artifacts/places
- **Sharing Opinions** - Players share information that they have collected to convince others of their (character’s) point of view
- **Influencing Others and Changing Opinions** - Influence key individuals to sway the vote
- **Final Decision** - voting

**Issues Looking Forward**

- **Weather/Seasons**
  - Need indoor equivalents to outdoor positioning for our partner organizations (zoos, gardens, schools, etc.) to feel comfortable that they can run indoors in event of weather.
- **Urban Campuses**
  - Again we need indoor (course scale) positioning when there are more buildings than open spaces to run games.
**Issues Looking Forward**

- **Finer Grain Positioning**
  - For both indoor and outdoor positioning it would be useful to have finer grained positioning so that we could use objects instead of areas or rooms as our unit.
  - But this needs to work without additional infrastructure or setup.

- **Standardization and Abstraction**
  - Need to make cross-platform application development and deployment easier.

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- education@mit.edu
- http://education.mit.edu/ar
- http://educationarcade.org