Learning Games != Edutainment

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THE EDUCATION ARCADE

STEP Pedagogical Frameworks

- **What kind of learning environments?**
  - Create highly **engaged**, motivated students
  - Provide **immersive** environments, **relevant** problems
  - Facilitate **collaborative, project-based** learning
  - Game-like, active, "**Hard Fun**"
    - A teacher heard one child using these words to describe the computer work: "It's fun. It's hard…" I have no doubt that this kid called the work fun <u>because</u> it was hard rather than in <u>spite</u> of being hard. [S. Papert, 2002]
  - Applicable to **formal** and **informal** settings, **extending learning** beyond walls of the school, beyond hours of the school-day
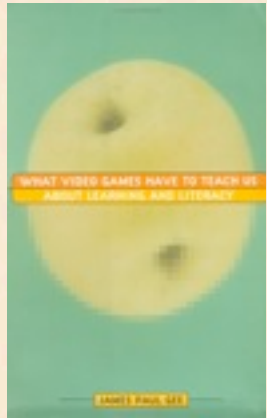
STEP/TEA Games R&D

Why Games?

- Games model the way that **"good" learning** happens

- Need new technologies to teach **new ideas**

- The **gamer generation** is growing

Learning From Games

- **What Video Games Have to Teach Us About Learning and Literacy (Gee)**
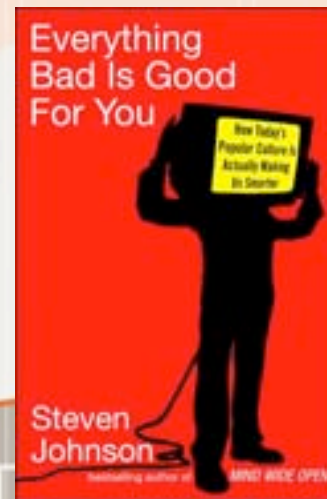 - Video games (even violent ones) model good learning

Got Game (Beck and Wade)

•People who grew up playing games are better adapted to the modern workplace

Everything Bad is Good for You (Johnson)

•Games involve critical thinking and problem solving - despite their image as "mindless"

Games? Learning?

The Legacy of Math Blaster

- Edutainment
  - Where play is the reward for learning

  - Instead learning should be playful

Making Real Learning Games

- Games can engage players in learning that is specifically applicable to "schooling"
- There are means by which teachers can leverage the learning in such games without disrupting the worlds of either play or school.

Learning Games!

- Learning games do not need to be
  - Big Budget 3D First Person Shooters
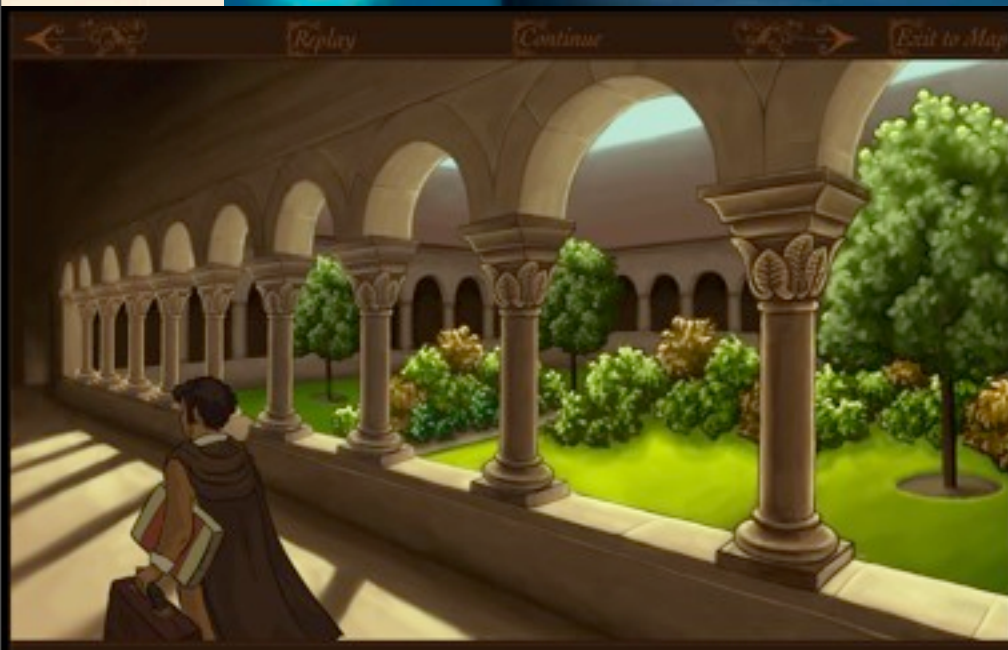
Learning Games!

- Learning games do not need to
  - Look like learning
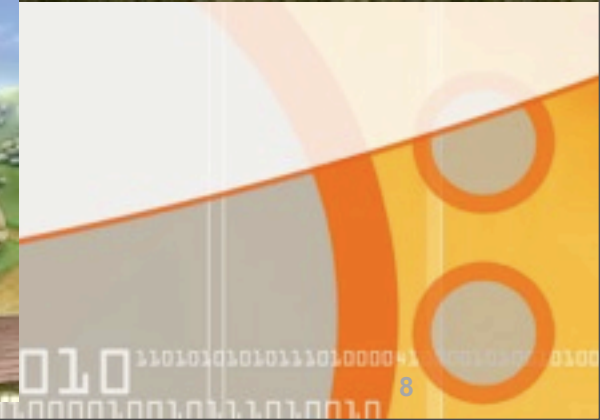
Learning Games!

- Learning games do not need to be
  - On the console/desktop

Brain Age = Learning?

Mobile Learning Game Hype

More Mobile Learning Games
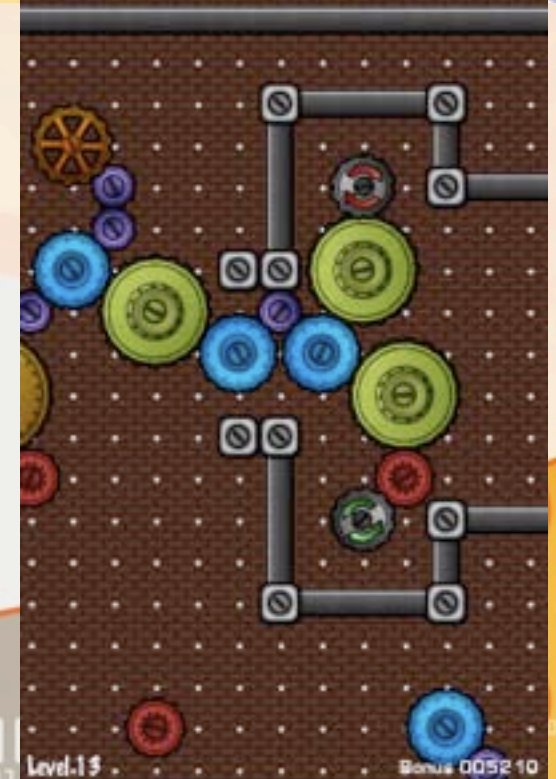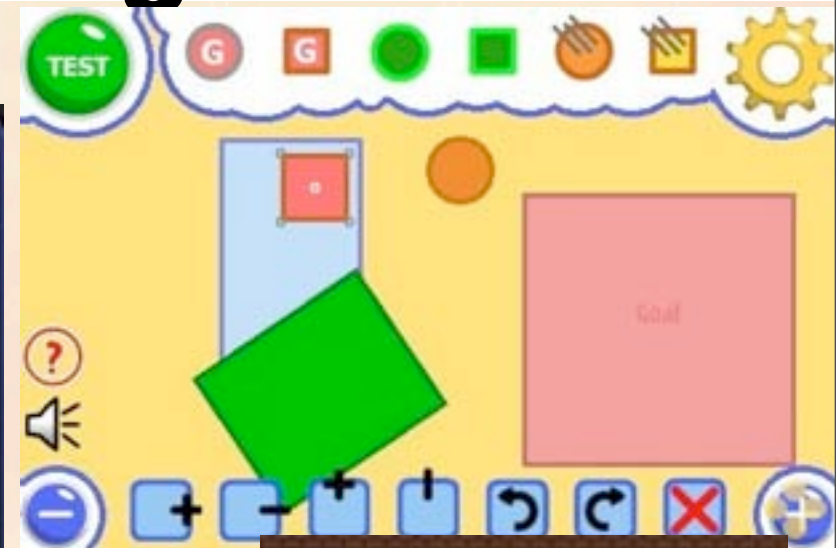
Casual, Mobile and Multiplayer

- Casual (not shallow)
  - **Short bursts of game play**
    - Able to fit into schedules
  - **Shallow learning curve**
    - Accessible to all
- Mobile
  - **Play anytime and anywhere**
    - Can reach many players on many platforms
- Multiplayer
  - **Interactions are rich and complex**
    - Facilitates collaboration and competition
- =Games "in" class

Participatory Simulations

- Engage learners in computer mediated simulations

- Provide rich learning experiences where technology and social interaction are key

- Use relatively simple and cheap technologies (Palms<$100) and IR peer to peer communication

- Virus, Genetics, Networks…

Virus

Virus

Participatory Simulation

Please enter your name to start playing
Mode: A

Eric.

Start

My Connections   3 eric

READY   Round: A   **Connections**

Players: 5   In cluster: 1

4 Rachel

3 Oren
3 Tau

Out cluster: 0

1 Simon

Sync   Done

Welcome

Tit for Tat

Prisoner's Dilemma Simulation

Please enter your name to start playing

Start

Palmagotchi - Anytime Anywhere

- Virtual pets with Biology
- Birds and flowers
  - Like Darwin's Finches in the Galapagos
  - "Every man is an island"

myWorld - Overvie 1:54

Little One	
Age: 4	
Callie	
Age: 4	
Rascal	

Birds | Flowe

myWorld - Creatur 1:55 ok

Little One

Age: 5
Mature
Energy: 183
Clutch Size: 2
Speed: 10
Metabolism: 40
Feather Type: 6
Featheriness: 5
Beak Length: 3
Color Preference: Red

Forage | Mate | Cancel

myWorld - Overvie 1:54

Fern	
Age: 1	
Hazel	
Age: 1	
Coriander	

Birds | Flo

myWorld - Creature 1:43 ok

Lucene

Pollen: 45
Nectar: 63
Color: Orange

Pollen Type: 7
Flower Length: 6
Production Rate: 16
Heartiness: 9

Cancel

Palmagotchi Game Play

- Foraging
- Mating
- Managing Risks

- → Mobile Web
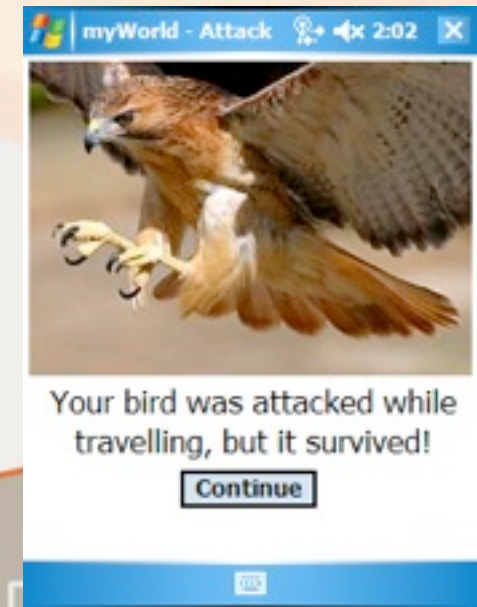
UbiqGames

- Mobile Web
- First Game
  - Pokemon + Weather Prediction
- Maintain creatures and battle creatures
- Impacted by "arena weather"

Today's Forecast — Highs/Weather Feb 06, 2009

06 Feb 2009 16:14 GMT / 06 Feb 2009 11:14 AM EST

Weatherlings

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

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**
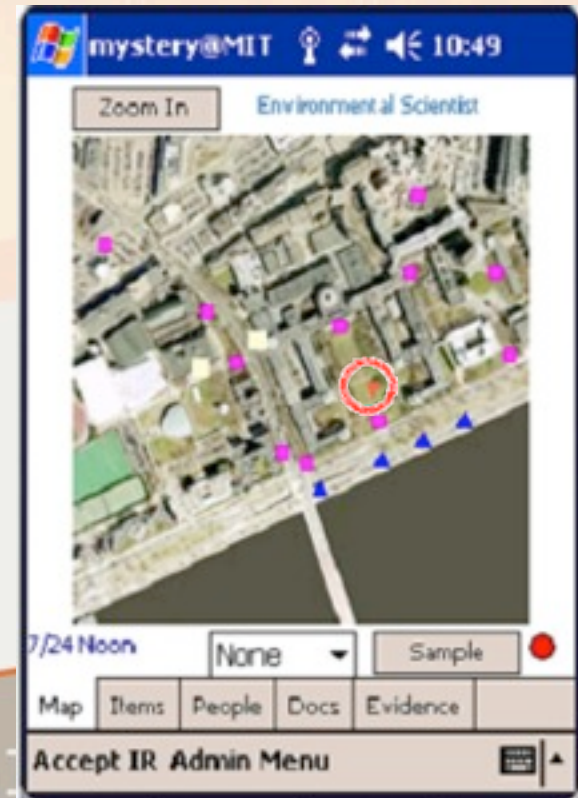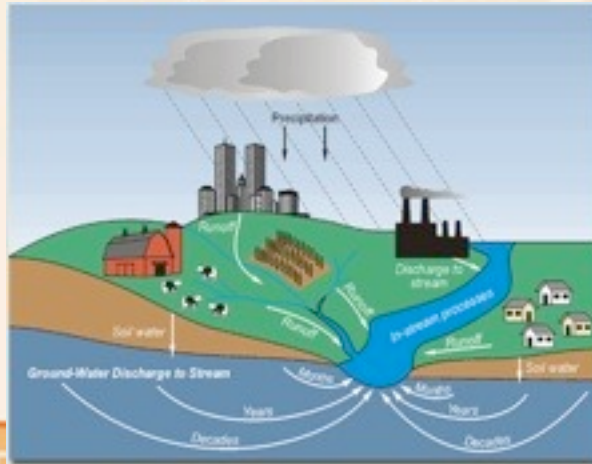
Why not use a virtual environment?

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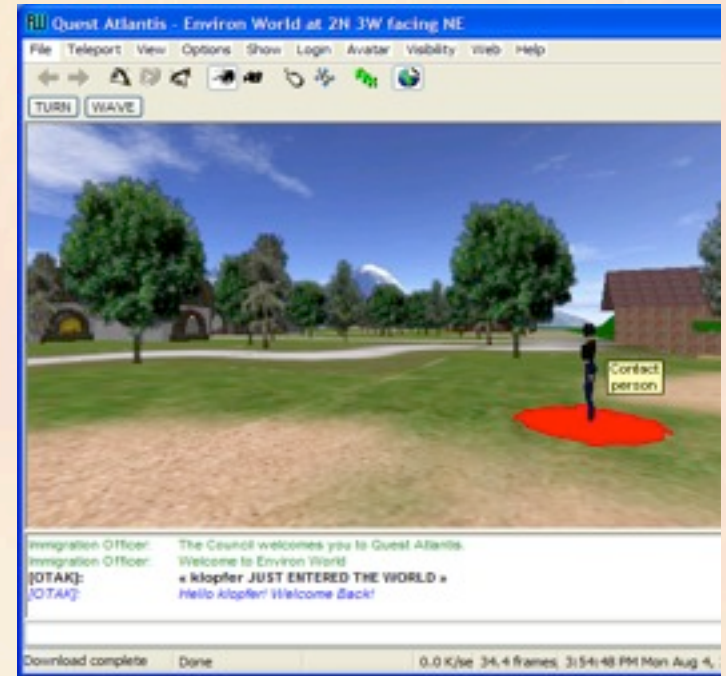
- *We can make multiplayer online games that recreate the locations and problem-solving in AR games, BUT*
- ***Communicating face to face*** *is different from online.*
- *Ability to **use the environment** differs*
- *Different **criteria are applied** in decision-making*

TimeLab 2100

- The year is 2100, the world needs your help!

- You are part of TimeLab, an elite group of historical researchers.

- Your mission is to go back in time to the year 2008 and research climate change to make recommendations how to battle the global warming effects observed in 2100

TimeLab 2100
Date: May 3, 2100
Map | People | Items | Docs

Dr. Danica Wong

Danica is the head researcher of the TimeLab in the Department of Applied History. She's the one in charge.

Timelab 2100 – Local & Civic

- Designed to bring to play some features of MIT's campus yet remain somewhat general

- Designed with the help of MIT experts in global climate change and city governance

- Opportunity for more involvement with the environment (get kids to take eyes off device)

Outdoor AR: In Schools

- Teaching math and literacy to middle school students in Milwaukee, Madison and Boston
- **Teacher-customized** (using templates) or teacher-designed games
- Moving towards **student-designed** games
- **Authoring toolkits** allow customization of a simulation's **location, content and timescale**.

StarSchools

ED.gov U.S. Department of Education
Promoting educational excellence for all Americans.

- *AR Simulation Games for Mathematics and Literacy Learning with Emerging Mobile Technologies*
- ***UW Madison / MIT / Harvard University***

"Moving" Games

- The "same" game is not really the same when it is played somewhere else

- Experiences that incorporate local information create the best experiences and can motivate learning

Outdoor AR Toolkit

- Grab map and GPS coords from Google Maps

- Drag and drop objects, NPCs, triggers, etc

- Customize dialog and media by role and time

Beta version **now** available
http://education.mit.edu/ar
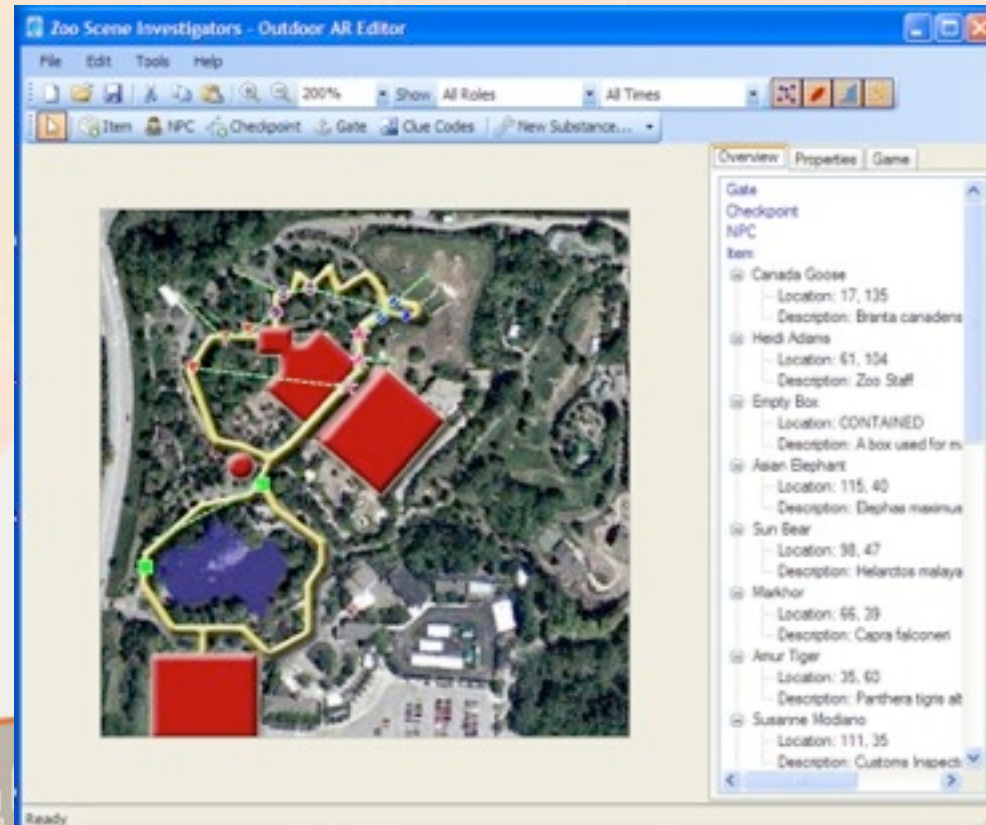
Game Builder

- Reduce complexity (constrain choices)
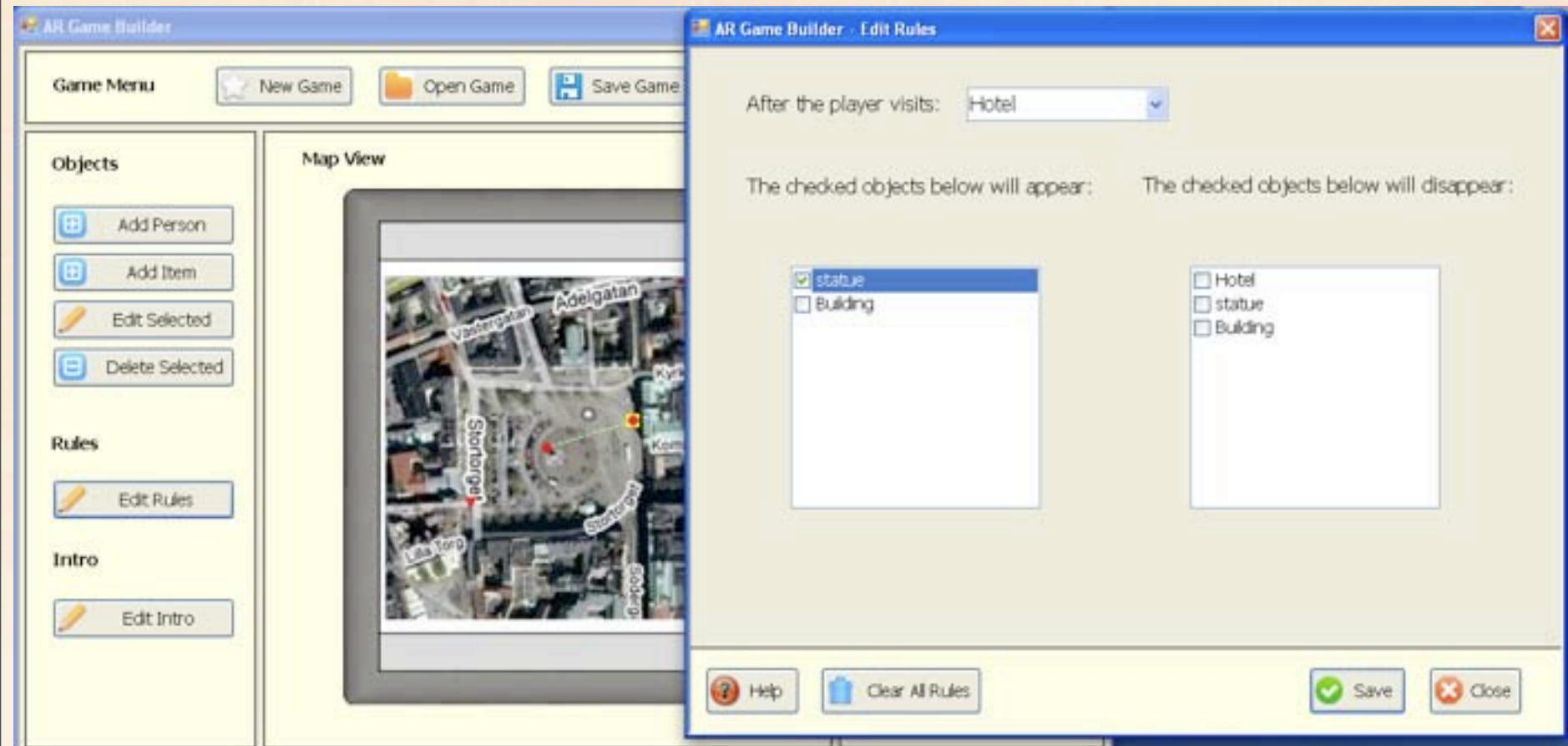
Expanding Platforms

(a) PPC Map

(b) PPC NPCs

(c) PPC Description Page

(d) iPhone Map

(e) iPhone NPCs

(f) iPhone Description Page

Learning Games!

- Learning games do not need to be
  - Created For You

Simulation Cycle
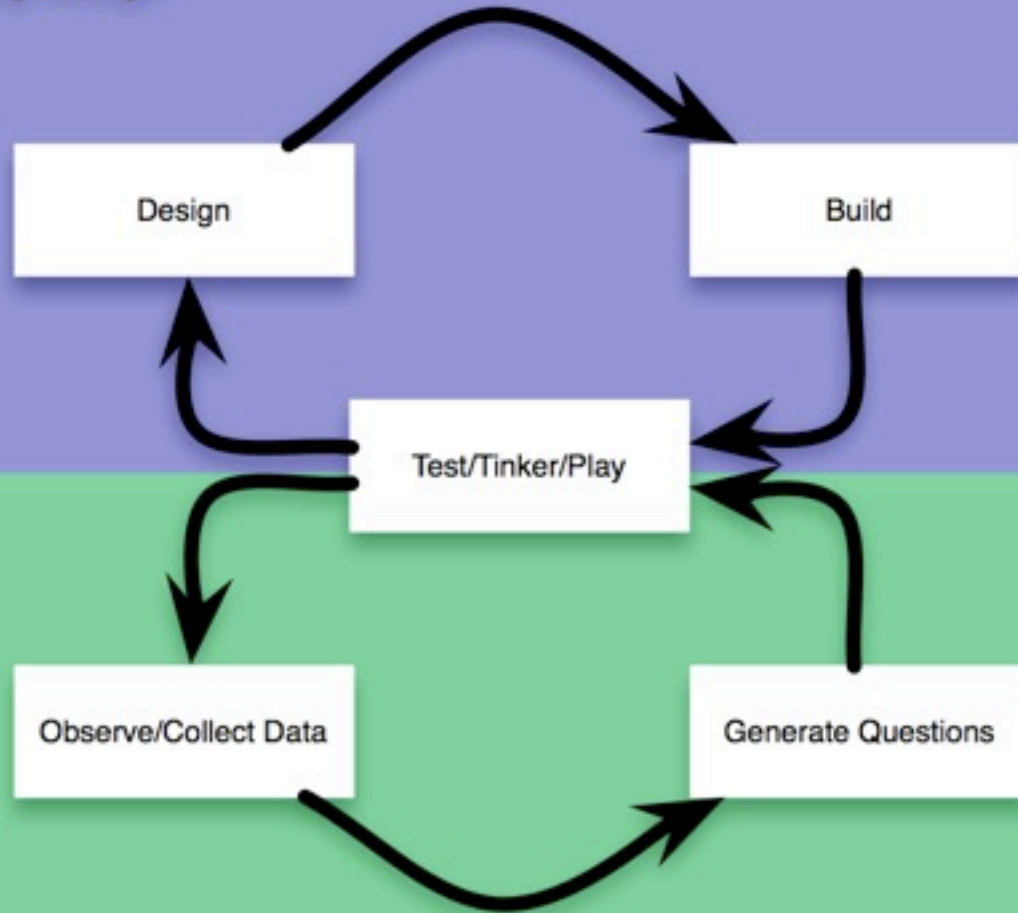
An intersection of science (bottom) and engineering (top).

• enter anywhere

• move throughout the cycles over time as the situation dictates.

Learning through Making

- E.g. Projectile Motion
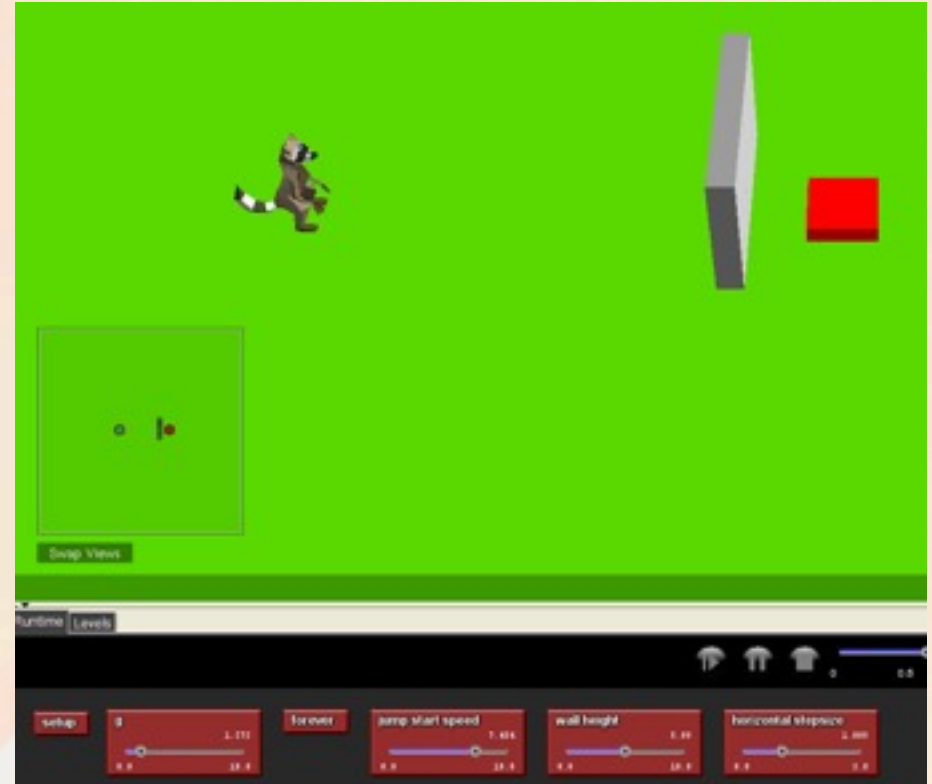
Learning through Making

- E.g. Phases of the Moon
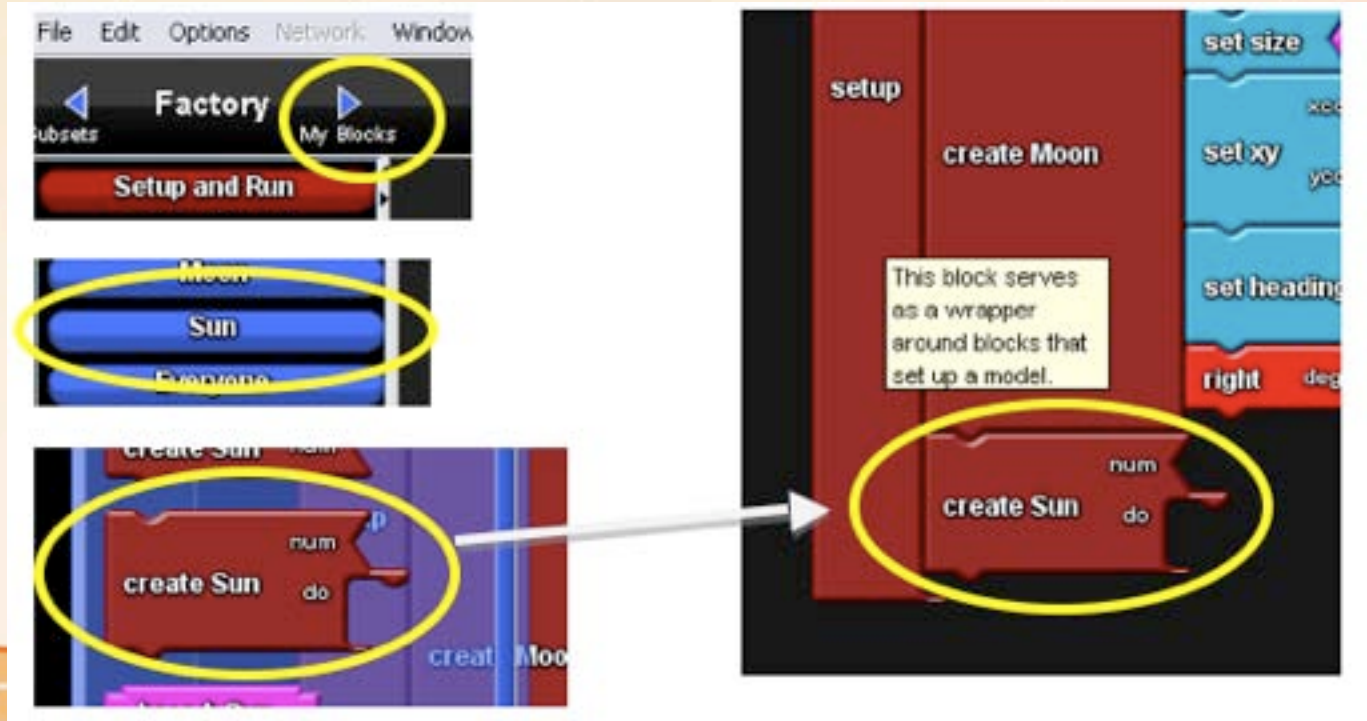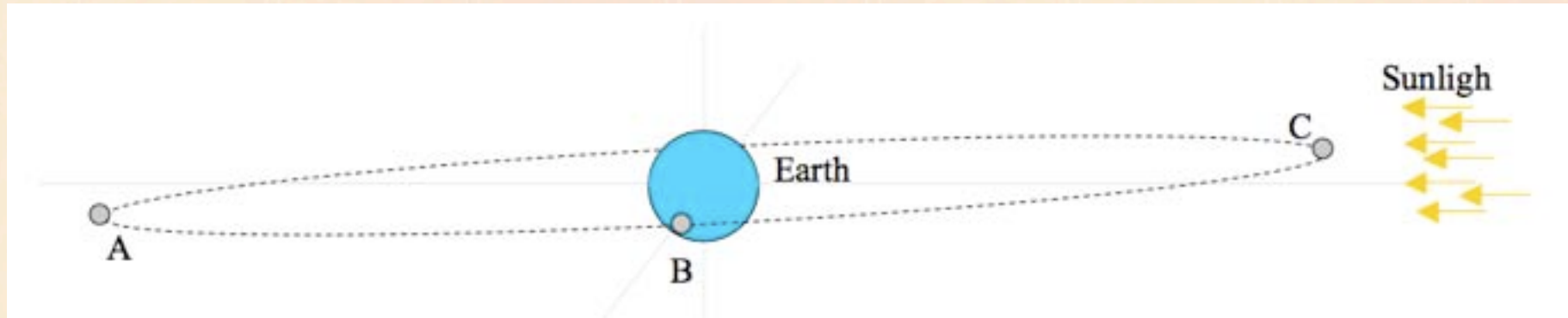
Student Games

M & C Final Game

Day 5: Today we began to work on our level two; the theme of this level is a City Street. We did our terrain before we added anything else. We made a main street go down the middle with other streets building off. After our streets were made we found all the xy coordinates for where we wanted our buildings to go. We added buildings, fire hydrants and cars.

Z and A's zapacman05

Day 6: Today we received the help needed and finished up the game. We created the fruit, and we set up the game style we desired. We settled down the controls and made it so the fruit was only on the black… We even added in some special text boxes for the gamer to look at.

1010010101010101111101000101001010101010101111101010000101010111010101111101010001

Creativity and Game Design

"Problem solving is the best way to learn because we are forced to understand every angle. The program also triggers my *creativity*, which I believe is not as important in school. Instead of *knowing a certain way* to figure something out like math problems, we have to *discover different ways* to reach the quickest time possible. This type of learning is out of the ordinary and I believe it is a necessity!" (emphasis added)

Thanks to:

- US Department of Education
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- Columbus Zoo and Aquarium
- Judy Perry, Josh Sheldon, Marleigh Norton, Lisa Stump, Hal Scheintaub, Daniel Wendel, Wendy Huang, Scot Osterweil
- TEP MEng and UROPs

AUGMENTED LEARNING

Research and Design of Mobile Educational Games

ERIC KLOPFER

Links

http://xenosisle.com

http://ourcourts.org

http://kids.generationcures.org

http://labyrinth.thinkport.org

http://fantasticcontraption.com

http://education.mit.edu/starlogo-tng

http://education.mit.edu/pda

http://education.mit.edu/ar