Augmented Reality in the Learning Sciences

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Webinar Agenda

- Introductions
- What is AR?
- AR in the Learning Sciences
- What are the learning affordances?
- Examples of AR
  - Eric
  - Susan
- Big issues or next steps in research

Introductions

We would like to know who you are!

Please tell us:

- Your name
- What your core area of research is
- What you are hoping to learn about AR in the learning sciences

AR in the Learning Sciences

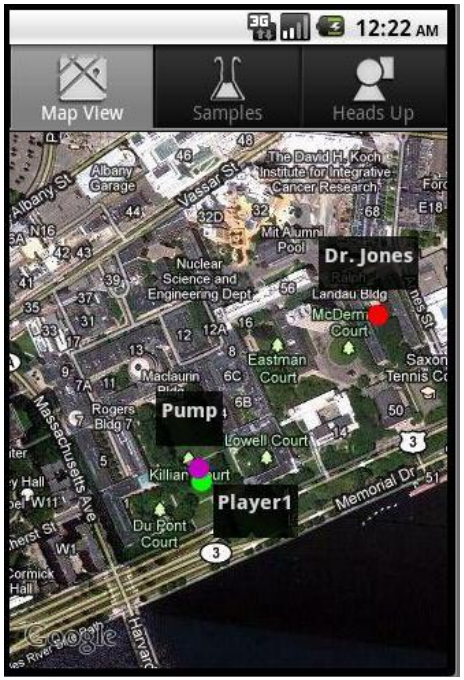
- Computer simulations or games on mobile devices triggered by real world contexts
- Table top or fixed position object in which virtual overlays reveal simulated information about the object

Learning Affordances

Affordance	Description
Visible	Allows users to see things that are normally invisible
Dynamic	Displays the phenomenon in motion showing changes over time
Details	Provides scientific details of the phenomenon
Interactive	Enables users to interact with the device
Scaffolding	Provides structures that focuses the users attention on relevant information
Investigation	Embeds learners in authentic situations and investigations
Collaborative	Social interactions are often collaborative

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 2012 and research climate change to make recommendations how to battle the global warming effects observed in 2100



Timelab 2100 – Off Screen

- ~10 minutes to discuss laws to nominate & prepare presentations
- Each group has 30 seconds to “pitch” their laws
- Each student has one vote for laws to go on ballot
- For each of the top 5 laws, dice roll determines fate

Timelab 2100 – Local & Civic

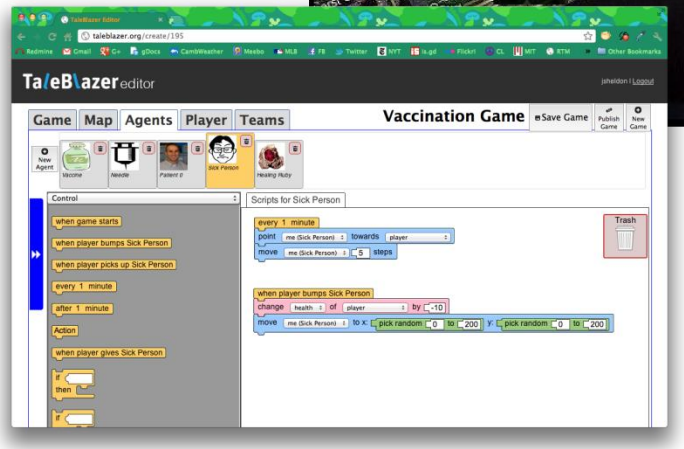
- Designed to bring to highlight some features of MIT's campus yet remain somewhat general
- Designed with the help of MIT experts in global climate change and city governance
- Opportunity for more involvement with the environment (get kids to take eyes off device)

Kids as Creators

- Community Science Investigators
  - Geographic Information Systems (GIS)
  - Augmented Reality Games
  - Service Learning

TaleBlazer

LOCATION-BASED AUGMENTED REALITY GAME PLATFORM



- A rich Internet application to author mobile, location-based games
  - Visual, blocks-based programming language
- Thought-provoking interaction with the real world

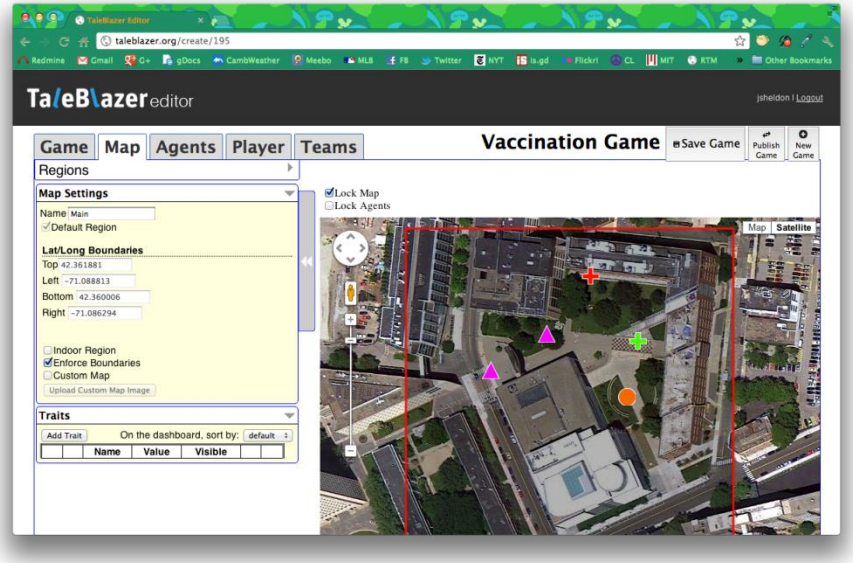
Augmenting Learning through Augmented Reality

TaleBlazer enables players to…

✦Explore their environment
✦Collaborate with peers
✦Engage with digital content
✦See the world in a new way

TaleBlazer enables authors to…

✦think deeply about place and content
✦create motivating scenarios, engaging narratives, challenging puzzles and games



Science Museums and Informal Learning

NRC (2009) *Learning Science in Informal Science Learning Environments*

Need for research in:

- How digital tools can enhance visitor experiences
- How museum experiences improve learning of scientific knowledge beyond engagement and interest
- How to develop deeper cognitive learning skills

ARIEL: Augmented Reality for Interpretive and Experiential Learning

Be the Path

Magnetic Maps

Bernoulli Blower

Research Design and Intervention

- Quasi-experimental with varying degrees of scaffold access in different conditions
- Used knowledge-building scaffolds in addition to the AR

- Scaffolds included:
  - collaborative groups
  - student response forms with questions
  - directions to reach consensus
  - embedded knowledge-building prompts,
    e.g., *Our hypothesis is* or *Our theory is*
  - bank of other student responses

Major Findings to Date

- We've run three different studies and a few sub-studies on the devices
- Major findings are:
  - AR alone can improve conceptual (declarative) understanding but modestly
  - AR with knowledge building scaffolds can improve conceptual and cognitive (reasoning skills) understanding
  - But knowledge building scaffolds may produce overformalized learning experiences (e.g., informal behaviors of play, experimentation etc. decrease)
  - AR influences collaborative behaviors which visitors say is the most important scaffold for learning

Future Directions of AR in LS Research

1. More empirical work on what is being learned and value added in learning.
2. Scaling up (more users) and across to formal educational settings (a lot being done in informal).
3. Design research on tools to support scaling to more sites (particularly relevant for landscape-based).
4. Access/diversity issues. Who can afford this? How does that change as technology advances?

Discussion Points

1. This is where the current field is working. Where would they like to see it going in the future?
2. How is any of this work synergistic with your own research or learning science interests?
3. What unexplored learning domains might match well with AR? How would you propose development/research in this area?
4. How might the example of the evolution of AR in the Learning Sciences inform the design of other emerging technologies in this field?