

**NeoMillennial**

**Learning Styles:**

**From Websites to**

**Distributed-Learning Communities**

**Chris Dede**

**Harvard University**

**Chris\_Dede@harvard.edu**

**[www.gse.harvard.edu/~dedech/](http://www.gse.harvard.edu/~dedech/)**

# The Evolution of Education

- **shifts in the knowledge and skills**  
**society values**
- **development of new methods of teaching**  
**and learning**
- **changes in the characteristics of learners**

**emerging information technologies**  
**are reshaping each of these**

# “Learning Styles”

- **Sensory-based**
  - **Visual, auditory...**
- **Personality-based**
  - **Myers-Briggs...**
- **Aptitude-based**
  - **Multiple Intelligences**
- **Media-based**

# Media Shape Their Participants Regardless of Age

## “Millennial” Learning Styles- I

- 1) **Web rewards comparing multiple sources of information, individually incomplete and collectively inconsistent**  
(mindlessly accumulating **or** seeking, sieving, synthesizing)
- 2) **Digital media and interfaces encourage multi-tasking**  
(superficial, easily distracted data gathering **or** a sophisticated form of synthesizing new insights)

# “Millennial” Learning Styles -II

## Personalization and Customization

- 3) Customized services based on data-mining for personal characteristics and behaviors
- 4) “Napsterism”: recombining others’ designs to idiosyncratic configurations  
(*Me + +*, William Mitchell, ‘03)

# Evolving toward Distributed Learning

- ✓ **Sophisticated Methods of Learning and Teaching**
  - ✓ Guided learning by doing
  - ✓ Apprenticeships, mentoring
  - ✓ Learning communities
- ✓ **Orchestrated across classrooms, homes, workplaces, community settings**
- ✓ **On demand, just-in-time**
- ✓ **Collaborative**

**distributed across space, time, media**

# “Next Generation” Interfaces for Distributed Learning

- **World to the Desktop:**  
Accessing distant experts and archives for knowledge creation, sharing, and mastery
- **Multi-User Virtual Environments:**  
Immersion in virtual contexts with digital artifacts and avatar-based identities
- **Ubiquitous Computing:**  
Wearable wireless devices coupled to smart objects for “augmented reality”

# What is a MUVE?

- ✓ A representational container that enables multiple simultaneous participants to access **virtual spaces** configured for learning.
- ✓ A place where learners represent themselves through graphical **avatars (persona)** to communicate with others' avatars and **computer-based agents**, as well as to interact with **digital artifacts** and virtual contexts.
- ✓ A learning experience that provides diverse activities in support of classroom curriculum.

# Findings from Gaming Research

**Massively multi-player online games (MMOG) and complementary fan-fiction offer rich learning and identity formation, but peripherally linked to life**



**Everquest game has 77<sup>th</sup> largest economy;  
over 120,000 fan-fictions online about Harry Potter**

# River City—Interface

The screenshot displays the MUVEES interface with several key components:

- View and Actions Space:** A toolbar at the top with icons for navigation and actions, and a menu bar with options like File, Teleport, View, Options, Show, Login, Avatar, Visibility, Web, and Help.
- Virtual Space:** A 3D environment showing a character in a dark suit looking at a brick building. Other characters are visible with name tags: "Carm Helton", "Emily Wilson", and "Miss Lott".
- Display Space:** A central text area with the following content:

**MUVEES**  
**Display Space**  
Welcome to MUVEES  
(Multi-User Virtual Environment Simulator)

*MUVEES is an engaging way to use advanced science techniques, related multimedia and virtual teaching and learning science.*

Please select from the following options. If this is your first time visiting MUVEES, we suggest using the tutorial to familiarize yourself with MUVEES before beginning.

  - **Tutorial on MUVEES - helpful for first time**
- Functions Space:** A "Tab Controls" window on the right showing a list of worlds and users:

6 Worlds	1 User
session1	1
session2	0
session3	0
session4	0
session5	0
session6	0
- Communication Space:** A chat window at the bottom left showing messages from "Dr. Jones":

Dr. Jones: Hello, Brian Nelson. Welcome to River City!

Dr. Jones: To help me uncover the mystery as to why River City residents have been suddenly getting sick, please look in your lab book on page 3 for a letter that I have written you about what you should be doing today.
- Toolbar Space:** A toolbar at the bottom right with icons for a house, a globe, and a magnifying glass.
- Environment Health Meter:** A blue bar at the bottom with the text "Environment Health Meter:" and a progress indicator.

At the bottom center, it says "20.6 frames/sec".

# Powerful Pedagogical Models

- ✓ guided inquiry learning with active construction of knowledge
- ✓ apprenticeship/mentoring relationships
- ✓ collaborative learning:  
social exploration of multiple perspectives

## How People Learn

(National Academy Press, 1999)

<http://www.nap.edu/books/0309070368/html>

# Situated Learning

- **constellations of architectural, social, organizational, and material vectors that aid in learning culturally based practices**
  - **apprenticeship (the process of moving from novice to expert within a given set of practices)**
  - **legitimate peripheral participation (tacit learning similar to that involved in internships or residencies)**

# Learning Community

A culture of learning, in which everyone is involved in a collective effort of understanding

- ✓ Shares and develops a repertoire of resources: experiences, tools, stories, ways of addressing recurring problems
- ✓ Allows a close connection between learning and doing
- ✓ Addresses the informal and tacit aspects of knowledge creation and sharing

*Within courses (lc-light) and in world (community of practice)*

# Distributed-Learning Communities

- ✓ Range of participants' skills and interests goes beyond geographic boundaries
- ✓ Asynchronous media enable convenient participation and deeper reflection
- ✓ Emotional and social dimensions intensified by synchronous virtual interchanges
- ✓ Broader range of participants engage in dialogue

**Mediated, Situated Immersion**

# A Different Model of Pedagogy

- **Experiences central, rather than information as pre-digested experience (for assimilation or synthesis)**
- **Knowledge is situated in a context and distributed across a community (rather than located within an individual: with vs. from)**
- **Reputation, experiences, and accomplishments as measures of quality (rather than tests, papers)**

# Summary of Significance of Implementations To Date

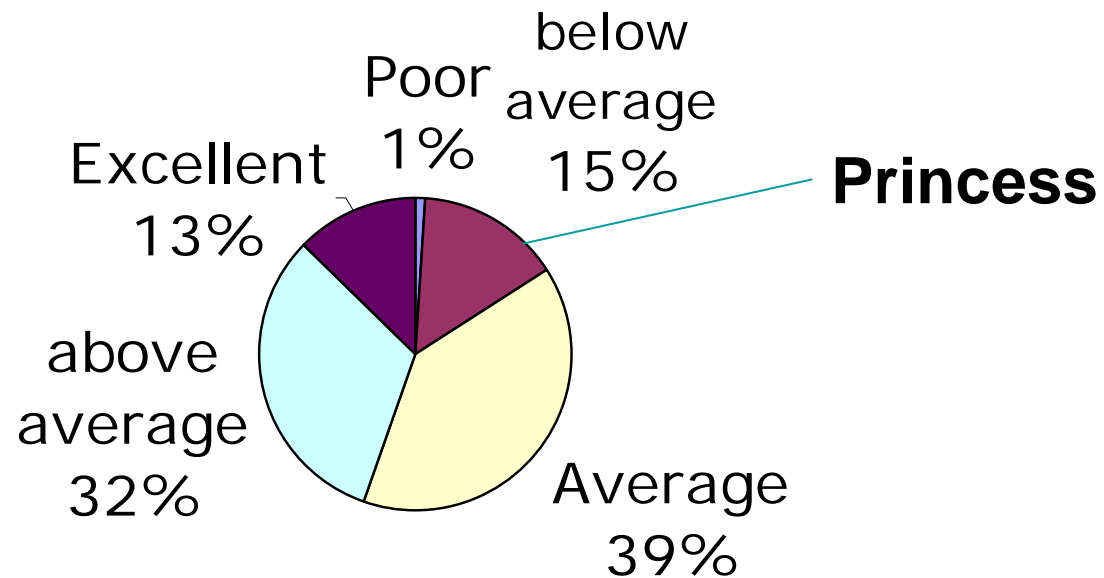
- MUVEES was **motivating** for all students, including those with lower engagement and achievement in science.
- MUVEES had a **positive effect on academic self-efficacy**.
- MUVEES had the most positive effects for students with high metacognitive awareness of the inquiry process.
- Students identified **multiple, interrelated causal factors** in the MUVE.
- Language was **not** a barrier to success
- Gender was **not** a significant factor.
- The MUVE with embedded guidance can support students' growth towards **self-responsibility in learning**.

<http://muve.gse.harvard.edu/muvees2003/>

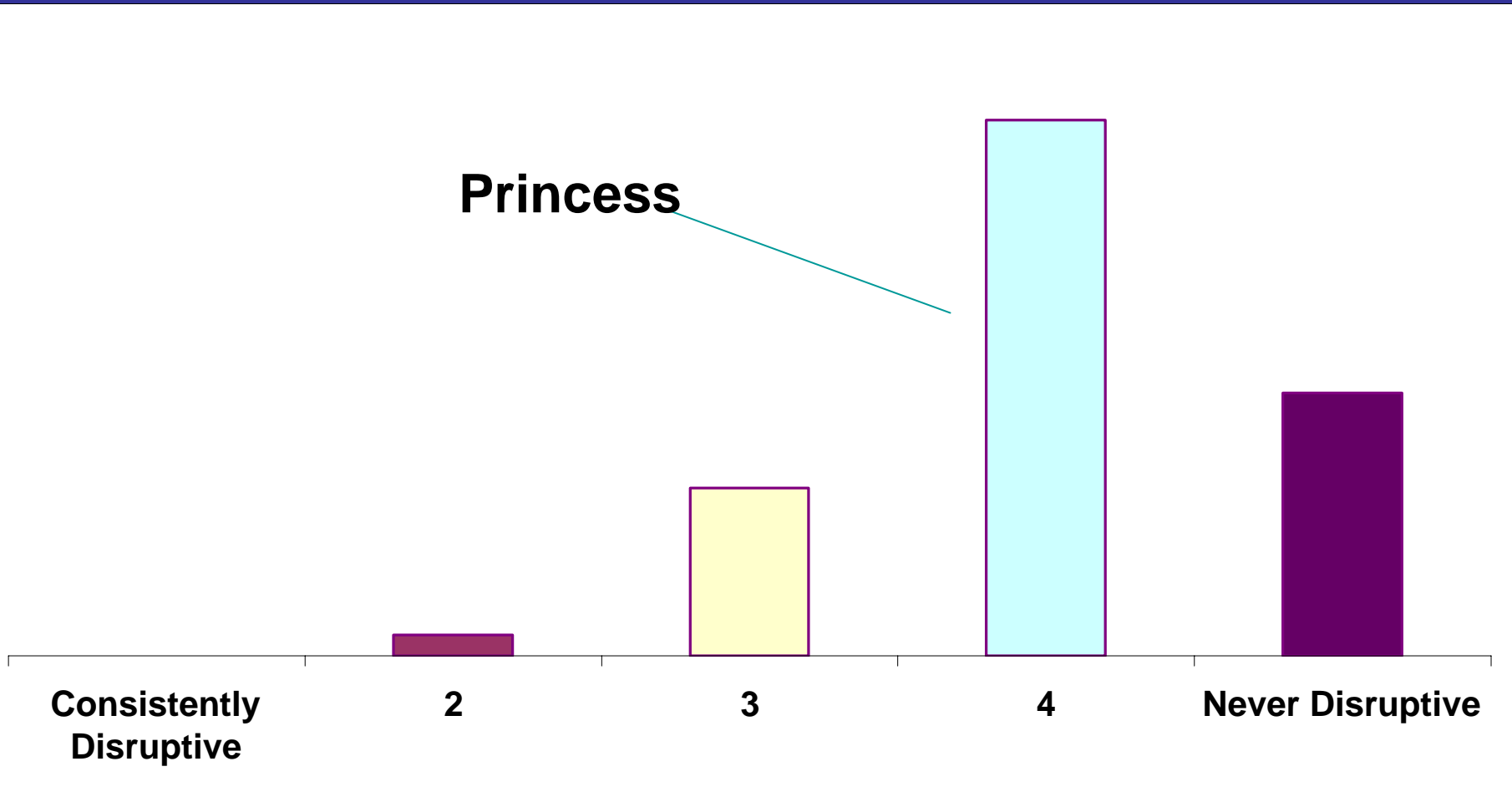
# Logfile Case Study: Princess

- age 12, 7th grade, D+ in science
- Reading below grade level
- Content scores started very low—approximately 10%
- Self-efficacy: The belief that one can successfully perform certain behaviors
  - At the start: just above average

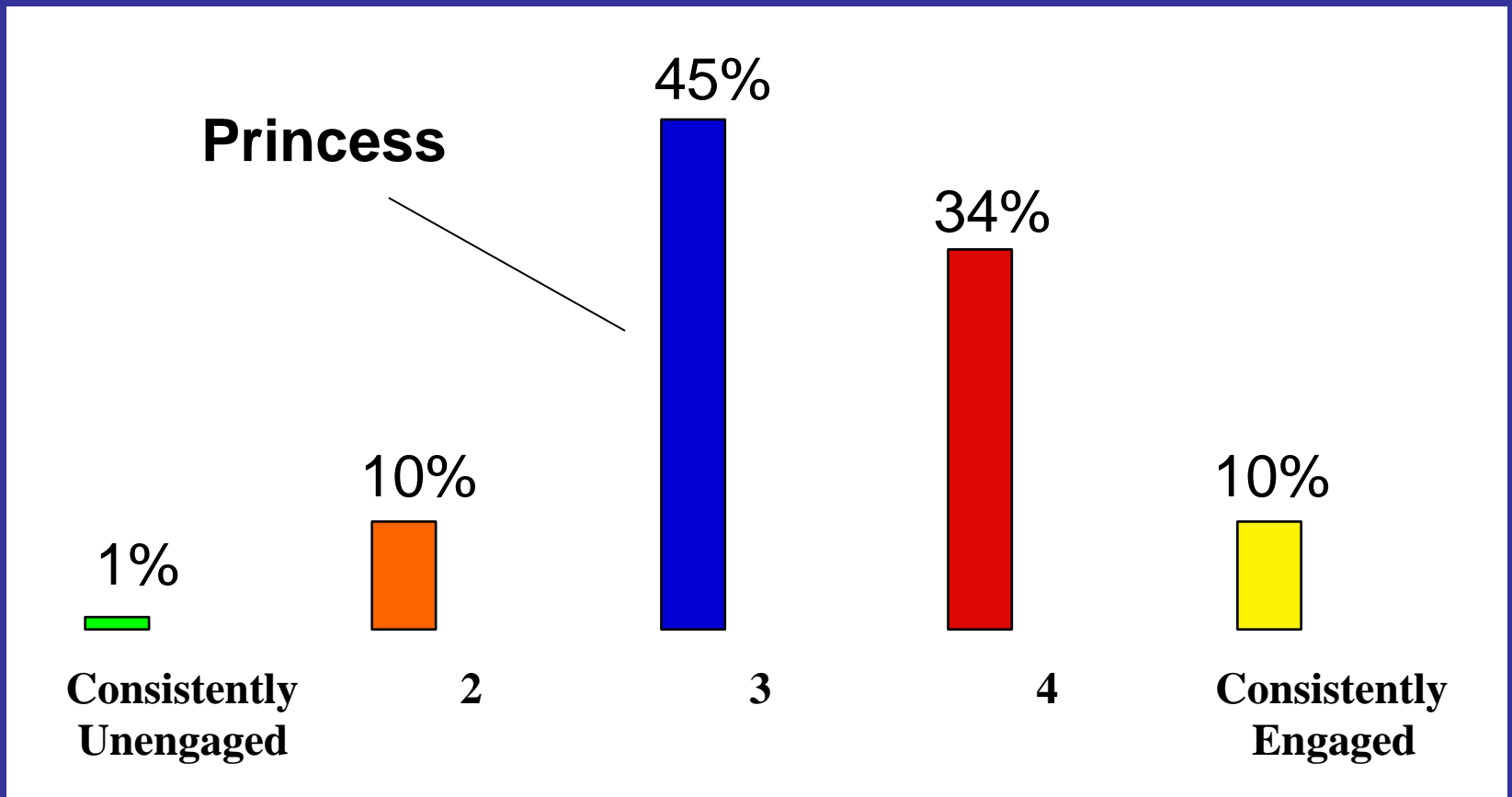
# Teacher Expectation of Student Success in Learning Content of Scientific Method and Disease (n=94)



# Teacher Rating of Student Behavior in Class (n=94)



# Teacher Rating of Student Engagement/Motivation in Class (n=94)



# Princess, Age 12, 7th Grade

Session 1	“your not supposed to ask some1 that who is in class your supposed to ask the ppl that with the [] around their names”
Session 1	“whose on my team”
Session 2	“where should I go”
Session 2	“james i have found alot steve u guys go to the wealthy homes me me there ok”
Session 2	“each one of us search a room ok met back right in the front aftger u finished”

# Princess, age 12, 7th Grade

Session 3	“how the sickness is spreading”
Session 3	“did u guys find something out...I did”
Session 3	“I GOT IT”
Session 4	“WELL AT THE HOSPITAL THE DOORS ARE OPEN AND ITS RIGHT NEAR THE DUMP AND THERE ARE ALOT OF PEOPLE IN THE TENEMENTS AND THEY REALLY ARE SICK SO YEA I THINK IT IS THE MOSIQUOTOS CAUSE THEY CAN CARRY THINGS FROM THE DUMP AND BRING IT TO THE”
Session 4	“WHICH WHEN I THENETMENTS PEOPLE GO OUT THEY GET THE WEALTHY POEOPLE ARE SICK”
Session 4	It could be the horse poop...welll when the mesquitos the miosquotos are attracted to it the smeell so when the get so of it like taste it or somethinf like that they carry it to the tenements which cause the poeple in the tentments

# Princess, age 12, 7th Grade

Session 5	“I am at the library to see if I can get any information”
Session 6	“just talk to people that you talked to Friday”
Session 6	“well i dont think that it is the water it was just a hypopthesis its just saying if the pipe was made of of lead. she just said if it was made out of lead she is just teaching her class?”

Despite repeated conversational gambits,  
Princess kept off-task conversation to a bare minimum

# Educational Outcomes—Princess

- Self-efficacy:
  - At project end: improvement of 17%
- Biology content:
  - 20% improvement
- Scientific process skills:
  - 10% improvement
- Her team's score the second highest in the class on the “letter to the mayor” performance measure

Two Week Intervention

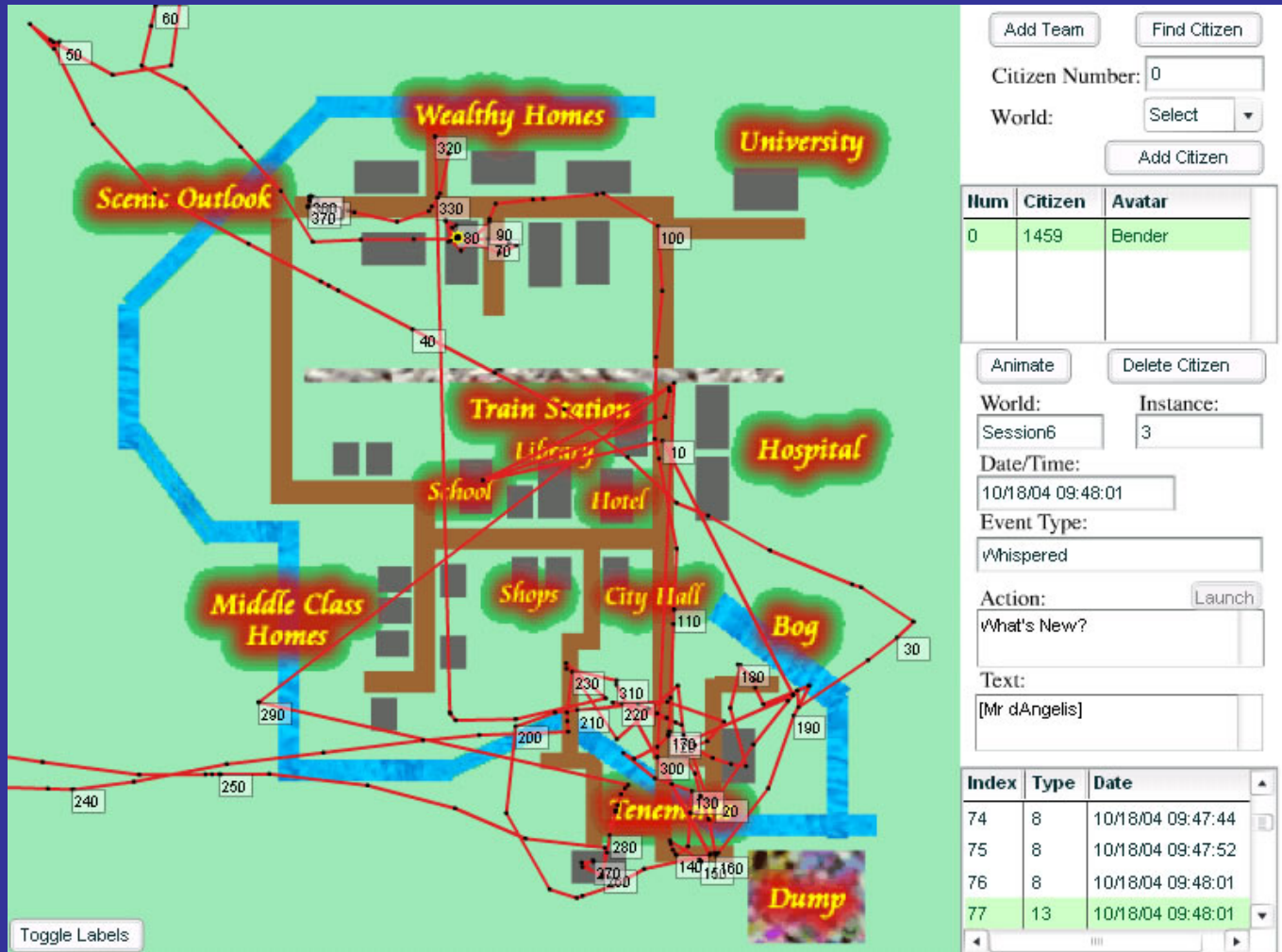
# Logfiles as a Database

## Indicates with Timestamps

- Where students went
- With whom they communicated and what they said
- What artifacts they activated
- What databases they viewed
- What data they gathered using virtual scientific instruments
- What screenshots and notations they placed in team-based virtual notebooks
- What hints they accessed

## The “Play Therapy” Hypothesis

# Visualization of Student Activities



# Illustrative Collective Logfile Analysis: Gender Patterns in Information-Gathering

- More female residents (21) than male (13);  
4 of 5 resident experts are female
  - Intentional to make environment comfortable for girls
- 96 students with same teacher logged about 3000 conversational gambits in two-week implementation
- Boys and girls talk to male and female residents in equal proportions
- Girls are substantially more active than boys in talking to residents
- Boys' conversations are task-oriented; girls add a social dimension
- Substantial individual variation in information-gathering patterns

# Evidence of Student Work

- **Student generated:**

- Lab book
- Letter to the Mayor
- Classroom behavior
- Attendance records
- Interviews/focus groups

- **Curriculum generated:**

- Pre-post assessment instruments
- Mini-mysteries
- Mini-goals to achieve next 'level'

- **Technology generated:**

- Log files
- Database
- Tracking of in-world activities



# “Neomillennial” Learning Styles

- 1) **Fluency in multiple media, valuing each for the types of communication, activities, activities, and expressions it empowers**

*This goes beyond “millennial” learning styles, which center on working within a single medium best suited to one’s style and preferences*

# My Distributed Learning Course

<http://my.gse.harvard.edu/icb/icb.do?course=gse-t502>

- face-to-face interaction
- videoconferencing
- wireless, handheld devices
- small group collaboration via groupware
- synchronous interaction in virtual environment
- asynchronous, threaded discussion
- informal website-based learning experiences
- shells for course authoring

**New Forms of Rhetoric**

# “Neomillennial” Learning Styles

- 2) Learning based on collectively seeking, sieving, and synthesizing experience, rather than individually locating and absorbing information from some single best source

*This goes beyond “millennial” learning styles in preferring reflective, communal learning via diverse, tacit, situated experiences over solo integration of divergent, explicit information sources*

# “Neomillennial” Learning Styles

- 3) **Co-design of learning experiences personalized to individual needs and preferences**

*This goes beyond “millennial” learning styles, which emphasize selecting a pre-customized variant from a range of services offered*

# Implications for Professional Development

- **Co-Design:**  
Developing learning experiences students can personalize
- **Co-Instruction:**  
Utilizing knowledge sharing among students as a major source of content and pedagogy
- **Guided Social Constructivism and Situated Learning:**  
Infusing case-based participatory simulations into presentational/assimilative instruction
- **Assessment Beyond Tests and Papers:**  
Using peer-developed and peer-rated forms of assessment

